Behavioral Determinants of Accurate Verbal Communication: An Operant Behavior-Analytic Approach

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14. ABSTRACT *(Maximum 200 words)*:

An analysis of interpersonal communication was performed in terms of the operant paradigm's controlling variables, Skinner's taxonomy of verbal behavior, and the relationships between these. In contrast to formal syntactic and lexical analyses, these functional models emphasize why people speak as they do, rather than how and what. Deviating slightly from Skinner's terminology, the key operant variables, interacting through multiple contingencies, are effector (response), consequator (positive or negative reinforcer and aversive consequence), potentiator (deprivation and aversive stimulation), and discriminator (discriminative stimulus). The verbal taxonomy's four major categories are mand and tact (which relate verbal to nonverbal behavior prescriptively or descriptively) and interverbal and autoclitic (in which components of verbal behavior are related to each other by recurrence or organization).

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CONTENTS

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H. McIlvaine Parsons, Ph.D

ABSTRACT

An analysis of interpersonal communication was performed in
terms of the operant paradigm's controlling variables, Skinner's
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ries are mand and tact (which relate verbal to nonverbal behavior
prescriptively or descriptively) and interverbal and autoclitic
(in which components of verbal behavior are related to each other
by recurrence or organization).

As a way to examine communication accuracy, the report empha-
sizes verbal deception and verbal error and how they differ,
especially with respect to consequators and potentiators (motiva-
tional variables). Varieties of verbal deception and error are
examined further within the framework of the verbal behavior
taxonomy. The report also emphasizes the interactions between a
Receiver (listener) and an Emitter (speaker) as these influence
each other, including the case where emitting and receiving occur
interactively in the same individual, often silently. Aspects of
such self-talk are discussed with reference to cognitivist inter-
est in introspective protocol analysis and folk psychology con-
structs such as intention that account for differences between
deception and error. Discernible verbal behavior and its control-
ling variables are suggested as a basis for understanding enceph-
alic processes.

In addition, the report examines the functional roles of
"rules" within verbal behavior, as substitutes for nonverbal
behavior embodying both descriptive and prescriptive relation-
ships. The report closes with brief descriptions of nineteen
communication domains to which the foregoing analyses might be
usefully applied to make communication more accurate, and 61
references.

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INTRODUCTION

The objective of this report is to analyze interpersonal communication in terms of the controlling variables and units of analysis of verbal operant behavior, with emphasis on the accuracy of such communication. Most analyses of verbal communication have been primarily concerned with its content or formal structure or with the performance of the source, and with the listener only as a recipient of information. In contrast, this analysis will emphasize functional aspects and thus, necessarily, the listener--and the interaction between speaker and listener. Such a functional analysis calls for explaining why a person speaks as he or she does, and explaining it as influenced by a listener's behavior. It calls in turn for explaining why the listener reacts in some particular fashion, as influenced by the speaker's behavior. This analysis employs the same explanatory variables for such behaviors as are applicable to behavior in general.

Since verbal interaction can occur in other than the vocal medium, this analysis will refer henceforth to "Emitter" or "E" rather than speaker and "Receiver" or "R" rather than listener. In a dialogue an individual alternates between being E and R. Also, whenever one is an E one is also an R, since we generally hear ourselves talk and see ourselves write. Nor is such intraindividual behavior always overt or public; we often talk to ourselves silently. This point has been emphasized by B.F.Skinner, a behaviorist recently ranked by graduate psychology department chairpersons as the most important psychologist there has ever been (Korn, Davis, and Davis, 1991). The operant or behavior analysis frame of reference in which this report is couched is Skinner's; it has been characterized as particularly useful for its comprehensiveness as a model or system for analyzing human behavior, especially from a functional viewpoint (Parsons, 1988).

Skinner's Verbal Behavior (1957) has provided much of the impetus for this report, which, as a result, interprets "communication" more broadly than simply the transmission of information, as might be the practice in human factors or cognitive psychology. Skinner felt that the term was used too restrictively for his purposes. Without a broader interpretation "communication" can be a misleading misnomer for E-R interactions, obstructing a full understanding of them. At the same time, the public uses "communication" in a variety of ways. Since that is often the case with "common" terms, from a scientific perspective it has seemed necessary to introduce new terms describing behavior to assure greater discriminability, terms missing or little used in lay vocabularies. Despite the burden such novelties undoubtedly place on a reader unfamiliar with them, some will be found in this report even though most of its readers will not be behavioral or other psychologists. However, scientific rigor has given way to convention, as with Skinner, in references to Emitter and and Receiver as individuals rather than to their behaviors, thereby perhaps implying some internal agency of action rather than the locus of controlling variables. Skinner dealt with this issue thus (1957, p.313): "The speaker is the organism which engages in or executes verbal behavior. He is also a locus--a

place in which a number of variables come together in a unique confluence to yield an equally unique achievement."

As already noted, the report will emphasize the Receiver--or in light of the above, R's behavior. Considered for the moment as a person, the Receiver may have been getting a raw deal from modern technology. Though television and radio broadcasting, for example, depend on having audiences, what the members of these audiences can do in reaction to what they see or hear is relatively limited, especially verbally. With TV they cannot talk back to agree, argue, question, expound, narrate, describe, or otherwise participate in a verbal exchange. One of their few recourses is to turn the set off. Another is to change stations. Little wonder that the "zapper," the TV remote control unit, is so popular--as is the call-in feature of radio disk-jockey programs. Though many critics have worried about the long durations of TV viewing by both young an old, replacing homework or other activities, less concern has been voiced about the one-way nature of such viewing and listening behavior. Yet frequent feedback is a normal component of living, both giving and getting it, and such feedback, both informational and motivational, involving both Emitter and Receiver, will be emphasized in this report. Couch potatoes may be harmed as much by this communication abnormality as by their indolence.

As also noted, this report will dwell on the accuracy of communication--more than its extent, or speed, or timeliness. But accuracy (truth) will be discussed in terms of its opposite, inaccuracy--often a useful way of dealing with an amorphous construct. Various forms of inaccuracy will be discussed, especially deception and error. By examining the behavior of both Emitter and Receiver and their exchanges, deception and error may be distinguished from each other. Although there have been numerous studies of human error, they have omitted a systematic operant analysis, and there has been only one operant examination of deception (Parsons, 1989); a joint examination of deception and error is new.

MEDIA

First, some limits must be placed on the kinds of Emitter behavior to be considered. The types are those that can be executed by an Emitter's vocal apparatus or hands/fingers when these produce complex codes of responses that a Receiver can sense primarily by ear or eye. The principal media are vocal and written languages. Additional visual media are pictorial (e.g., icons) and gestural (e.g., signing); an additional auditory medium may consist of other sounds (e.g., signals). Media are often combined. Mechanical, electrical, and electronic artifacts may intervene between E's outputs and the inputs to R. Coding and complexity as parameters are each on a continuum. Cut-off points are somewhat arbitrary; for example, playing chess, cards, or checkers might be admitted but will not be. The stated parameters exclude as Emitter behavior various actions such as fighting, sexual encounters, athletics, and music, painting, and sculpting. The Emitter behavior included is otherwise social and for convenience will be called verbal. It approximates Skinner's

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usage of "verbal behavior" (Skinner, 1957, 1989). Such behavior has an unusual aspect. One cannot see oneself seeing (except in a mirror) or walk around one's walking, but one can talk and write about talking and writing. As another special aspect, some media may take a form that another person cannot see or hear. Subvocal speech may be silent--muscle activity detectable only by instruments--and some silent speech, undetectable even by instruments, is reported only by the Emitter. If one's writing remains hidden from any Receiver, it also is detectable only by its Emitter.

RECEIVERS

The Receiver is important if only because, in a functional analysis of verbal behavior as just specified, without Receivers there could be no Emitters; "listeners are responsible for the behavior of speakers" (Skinner, 1989, p.36), and further: "Neither in the evolution of a verbal environment nor in the conditioning of speakers and listeners does speaking come first. There must be a listener before there can be a speaker." A columnist in the Washington Post recently wrote, "But they listened, therefore I was" (Hoagland, 1991). Listening and reading are operant behaviors subject to the same kinds of controlling variables as speaking and writing. Though they have received less operant analysis than the speaker, often being more likely to be silent or unseen (covert), their examination can hardly be avoided in this report, especially in connection with human error and deception.

As a feedback device the Receiver can function in a servomechanistic (informational) as well as an operant sense. The Receiver becomes an Emitter back to the person who was the initial Emitter. Technically, the Receiver might actually be called a Transponder, a device that both receives a signal and transmits information related to that signal back to the signal's source. The Receiver might also be considered as part of an internal feedback loop, in which the Emitter transmits back to himself or herself--Emitter and Receiver operating within the same individual as internal transponders. As stated at the outset, we do talk to ourselves, most often in silence.

Although limits have been placed on what Emitter behavior should be the focus of this analysis, behavior other than verbal must be considered relative to an Emitter/Receiver interaction, notably with respect to the Receiver. The Receiver may react non-verbally. For example, a young Emitter might ask an adult Receiver for a piece of candy. The Receiver then gives one to the Emitter. That action in itself is not verbal. Another instance: The Emitter describes some object outside as a fox among the sheep. The Receiver goes and looks. No fox. Going and looking at physical objects is not verbal behavior but some ensuing report to the Emitter embodying a visual discrimination is such, whether true of false. So would such a report by the Emitter. In short, much verbal behavior influences nonverbal behavior, and vice versa.

An Emitter might say something to a Receiver that makes the latter fearful, joyful, sad, or angry. Though affective ("respondent") behavior like this does not fall into the verbal category in the present analysis, it often occurs in E/R exchanges,

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such as those in which an E attempts to alter an R's attitude or opinion, to make him or her like or dislike someone or something. Respondent behavior consists of innate reflexes and stimuli conditioned by association with these in the Pavlovian ("classical conditioning") paradigm. Respondent and operant behaviors frequently are mixed. The relative disregard of the respondent variety in this article should not imply unimportance.

Receivers can, of course, be categorized in various ways, such as number: a single individual, multiple individuals, i.e., group, and an entire community, subculture or culture, as well as a "self" (E and R within the same person). Skinner often referred to "the verbal community" to indicate that people in some subculture or culture would be reacting similarly as Rs to some E's verbal behavior. A group could be a family or a particular audience of Receivers.

How significantly has the Receiver figured in studies of communication? Although one has usually been assumed, there appears to have been only a limited interest in the Receiver as an influence on the Emitter. The absence of an interlocking relationship between Emitter and Receiver is especially apparent in research and analysis of "human information processing," a current and popular form of cognitive psychology. In its models, by and large, "information" flows into a Receiver and is processed there but rarely if ever leaves or returns to the Emitter as feedback affecting that person's production of information.

OPERANT PARADIGM (FRAMEWORK)

Disregarding for a moment the roles of Emitter and Receiver and the media through which E operates on R (or vice versa), consider what brings about any operant behavior in a human being. (Here "operant" is all acquired behavior except the "respondent" type mentioned above.) According to the operant paradigm, any behavior is the product of a complex of contingent relationships among the following four types of controlling variables.

Effectors

One of these four categories is some component of an individual's performance. Of various dimensions and specified by contingent relationships with other categories, the component consists physiologically of a motor act (including inaction) that operates in some fashion on something (in the environment or another part of the individual) to affect it in some way. The effect on that something in turn influences the performance so it is repeated or changes. The component may be as brief as pressing a button that activates an air conditioner which changes the ambient temperature or as extended as walking to a restaurant that then serves one dinner. Call this behavioral component an effector. As a basic human process there exists a tendency for somewhat differing effectors to respond to the same input. The term "operant" may label a class of effectors.

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Consequators

The second type of variable is an input or stimulus that follows an effector. To acquire its functional role it must be contingent on the effector by following it after an interval that can vary somewhat but must be brief. As a second contingency, whether the effector occurs again depends on whether the first contingency occurred. Thus, this second type of variable makes the effector's recurrence more likely or less likely. Call this variable a consequator. It affects an effector as a positive consequence (consequates it positively) to make the effector's recurrence more likely or as a negative consequence (consequates it negatively) to make it less likely. The cooling that results from pressing the air conditioner button (in a high ambient temperature) makes it more likely that one will press it again; if one pressed the heater button, it is less likely one will do so again under the same circumstances. A tasty dish positively consequates walking to the restaurant; a disappointing meal is a negative consequator.

Potentiators

The third type of controlling variable is a condition or operation that makes a consequator strong or weak, effective or ineffective. Call this a potentiator. Potentiation comes in four varieties. One, often called deprivation, means something is lacking; it strengthens a positive consequator that provides something. Another, sometimes called aversive stimulation, strengthens a positive consequator inherent in the removal, reduction, or prevention of something. The welcome restaurant food would have less effect as a positive consequator if the patron had already had dinner. The drop in ambient temperature would consequate activating the air conditioner only if the tmperature had been high. The other two varieties, less often considered, concern negative consequators, such as physical injury or the loss of money that is the outcome of an effector. An aversive condition should be absent for its imposition to be an effective negative consequator. A desirable condition should be present for its removal to have an effect. Though potentiators are readily identified when they are biological, they can also be social and verbal. Another person can be a potentiator, through absence (deprivation) or unpleasantness or hostility (aversive stimulation). Verbally setting a goal can be a potentiator (the goal being the consequator, to be achieved or avoided, depending on its nature. Lack of information could be regarded as a potentiator in, say, a problem solving or decision making situation, thereby making the needed information a consequator for the behavior of acquiring (and processing) it. Other insufficiencies are potentiators that strengthen consumer products as consequators for purchasing them and strengthen loot as rewards for crime.

A consequator is contingent on a potentiator, by and large, but the reciprocal may also be the case. Though some potentiators are imposed simply by a physiological processes or natural event, often their extent is contingent on a consequator that

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occurs in behavior. A potentiator's strength may diminish due to the consequator associated with it. For example, though physiological processes in the passage of time since the last meal potentiates the consequating power of food, that strength decreases with satiation from consuming the food. Becoming chilled due to a drop in temperature potentiates one's overcoat as a consequator for putting it on to warm up. But the overcoat would not consequate the act of putting it on if one was already wearing it to avoid the cold. A potentiator may be imposed verbally on one person by another who is then consequated for doing so.

Discriminators

The fourth type is an input to the individual that selects among possible effectors or between one and none at all; colloquially it might be termed a cue or signal--a button's label or a street sign. It acquires its selective capability by prior association with an effector in conjunction with a consequator. Its strength is contingent on that joint association, which gives one particular input stimulus more control than another in selecting whether some effector or stimulus-effector combination recurs. Call this fourth type a discriminator. The consequation-contingent conditioning of a discriminator counters a basic human process of tending to react to somewhat differing stimuli with the same effector; that process is termed stimulus generalization. A discriminator precedes an effector. Or it follows one as a selective input for a subsequent effector. For example, if a discriminator (e.g., some indicator) after the button press shows it was ineffectual, one presses the button harder or tries a different button. After entering the restaurant, new discriminators there (e.g., a bar) prompt one to order a martini. Thus there are both antecedent and subsequent discriminators; the latter may function as informational feedback for either repeating or changing the effector, and also may be conditioned to become consequators.

Contingencies

Thus according to this presumed paradigm, effectors are contingent on consequators minators, consequators on effectors and potentiators, discriminators on effectors and consequators, potentiators on consequators--and all of these on other, additional variables. Human behavior is not simple. It seems to be controlled by networks of contingencies, presumably embedded in neural networks of greater intricacy than some that have been proposed. It is "the behavior of a most complex creature in contact with a world of endless variety" (Skinner, 1957, p.452). One complicating factor is the competition, so to speak, that goes on among the controlling variables: between effectors, between discriminators, between consequators, and between potentiators. For example, some behavior may reflect a conflict between a positive and a negative consequator--between reward and punishment, more or less. Or these may be combined to produce the same behavior--the carrot and stick process. Along with discrimi-

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nator (stimulus) and effector generalization, such competitions and combinations change behavior, instead of the same behavior occurring repeatedly (habit).

Temporal Factors

Another complicating factor is the future as dealt with in the present. Potentiators create future consequators. Discriminators can affect future effectors, especially with verbal help. Effectors are indirectly influenced by consequators that will occur only at a later time. Future positive consequators are called incentives, negative ones disincentives or deterrents. To influence current behavior, incentives and disincentives must function as discriminators that have been conditioned by past consequators; the linkage can occur through verbal behavior. The past also, of course, influences current behavior. Prior operant conditioning, nonverbal or verbal, affects current performance and acquisition, nonverbal or verbal including the competition between variables; verbal linkage across time occurs here too. Discriminators acquired in the past still contribute to what we do and say, whether riding a bicycle or reciting a poem. Temporal factors, future or past, short term or long, are omnipresent in the operant paradigm.

Multiple Functions

To add to the complexity, it is presumed that the same input or condition may have more than one operant function (as well as a respondent one), though differences must occur physiologically to differentiate them. For example, the same stimulation (e.g., a temperature change) may function as a potentiator giving consequation strength to an overcoat or as a discriminator evoking the conditioned effector of putting it on. The same outcome after an effector may function as a consequator or as a subsequent discriminator for the next effector, whether the same or a different one. That duality of function indicates two kinds of feedback, one motivational, the other informational. (The term "motivational" here means a combination of consequation and potentiation; in popular parlance "motivation" is a much abused and poorly defined construct, and "motive" approximates potentiation. The term "informational" here means discriminative; "information" is also a much abused and poorly defined construct, and its cognitive use parallels antecedent discriminatiors.)

Analogues

What has been presented is a highly simplified account of a "behaving system" (Skinner, 1957, p.451) in which behavior is shaped by its consequences. Its interdependencies are too many to describe here fully, and not all are entirely certain. As a closed system it has two analogues. One is cybernetics, which also emphasizes a closed-loop input-output-feedback organization but whose functioning depends on factors external to the loop: (1) sources of the reference signal; (2) sources of the power that moves the machine to close the loop; (3) external impacts

that can disrupt the entire machine; and (4) internal disturbances, e.g., wear and tear. The other analogue is evolution, characterized by change through selection. Although also conceived as a closed system, increasingly it is believed that external occurrences such as catastrophes have perturbed evolutionary change. The operant paradigm acknowledges but does not incorporate factors external to it, such as respondent conditioning, innate or genetic variables, cultural controls, and large-scale physical and social occurrences; it does not acknowledge supernatural forces or immaterial entities such as soul or mind.

Terminology

It should be added that the terminology in this article's description differs somewhat from conventional operant nomenclature. In the latter, effectors are "responses," consequators are "positive reinforcers," "negative reinforcers," and "punishers," potentiators are "deprivation and aversive stimulation" (according to Skinner, 1957) or the equally laborious "establishing operation," and discriminators are "discriminative stimuli." Nor is the third variable category explicitly included in the conventional "three-term contingency" paradigm, although in a revised preface to his The Behavior of Organisms Skinner (1988, p.356) wrote that in addition to the usual three terms, "at least one other variable is implied"--the deprivation associated with the reinforcer. It is hoped that less confusing and effortful labels are more suitable for this report's readers, most of whom will not be well trained in operant psychology. As noted in the Introduction, technical terms are needed in a scientific account, but the scientist should try to minimize the labor of understanding and using them.

Verbal Behavior

The four types of variables in the operant paradigm are applicable to both Emitters and Receivers. An Emitter produces verbal effectors contingent on (1) discriminators from the environment (nonverbal and verbal), the Receiver, and self and (2) consequators (nonverbal and verbal) also from the environment, the Receiver, and self. The Emitter produces verbal effectors that are, for the Receiver, discriminators, consequators, or potentiators. The Receiver receives (1) discriminators from the Emitter, the environment, and self, and (2) potentiators also from the Emitter, the environment, and self. In turn the Receiver becomes an Emitter (to the previous Emitter or to self), with equivalent types of input and output.

CATEGORIES OF VERBAL BEHAVIOR

To make more sense of the above it seems advisable to describe the particular functional categories of verbal behavior as taxonomized by Skinner (1957), discussed by others including Winokur (1976) and Chase and Parrott (1986), and supplemented in this report. These categories are related to the four types of

variables in the operant paradigm. It will be difficult to do justice to Skinner's analysis in a short treatment but some exposure seems necessary. By being differentiated according to function rather than structure or form, the verbal categories differ from more familiar classifications such as lexical, semantic, grammatical, syntactic, propositional, interrogative, imperative, etc. By function is meant both _why_ some verbal effector is emitted and what it _does_ in Emitter-Receiver interactions. Since such interactions are here limited to the verbal, all of the categories consist of verbal effectors, which come in many sizes, from micro (word fragments) to macro (a sentence or longer). Many of their functions pertain to relationships among these effectors, not just to relationships with the external world.

Mand

In this category, probably the most primitive in human verbal behavior and one that can be conditioned in chimpanzees, the Emitter calls on a Receiver to do--or not do--something. E transmits a question, a request, a command, a goal, some advice, an entreaty, a threat, a warning, an intention, or a promise. It can verbalize a potentiator in the Emitter or function as one, though differently, for the Receiver. The dual role of this category in verbal behavior has major significance for analyzing such behavior, especially when that occurs in the same individual, overtly or covertly. In another duality, a mand can concern either a nonverbal or a verbal action, e.g., to move something or answer a query.

Emitter. For the Emitter this category is a verbal parallel of nonverbal potentiators, such as a deprivation (e.g., of food- -"hunger," or money --"impecuniosity"). Resulting from such a potentiator, it verbalizes its effects; the hungry Emitter says to the Receiver, "Give me some bread." However, it can also reflect simply a verbal deprivation (e.g., of information-- "ignorance," or of guidance--"uncertainty"); the Emitter asks the Receiver a question. It may be the verbal parallel of an aversive condition (e.g, of physiological damage--"pain," or of some performance overload--"stress"); the Emitter says, "Let me rest." But it can also consist of a verbal aversive condition impressed on the Receiver (e.g., criticism or threat). It may indicate not only something the Emitter lacks but also state what the Receiver can provide to redress that deficit, or it indicates something aversive (e.g., discomfort) that the Emitter is experiencing but the Receiver should remove. In each case it specifies something the Receiver can do that would modify this potentiator; when done, that something positively consequates the Emitter for expressing the potentiator. This potentiator category in verbal behavior is called a _mand_.

Receiver. The same verbal effector, as mand, imposes a potentiator on the Receiver. This different potentiator strengthens the consequator the Receiver gets for producing a suitable reaction to the mand--the bread or an answer to the question. If the mand produces "aversive stimulation" in the Receiver, as might a threat or even a question, the stimulus accompaniments of a reaction that avoids or diminishes that aversive stimulation

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constitute the consequator for the Receiver; many mands seem to fit this analysis (Winokur, 1976), though they may be only mildly "aversive," as in embrarassment, tension, or discomfort. (A better term than "aversive" seems desirable.) The very avoidance of or escape from the condition consequates whatever is done to avoid or escape it. If on the other hand the mand potentiator produces some "deprivation" in the Receiver ("guilt"?) as might an entreaty, the stimulus accompaniments of giving the Emitter what was requested could consequate the act of giving. In addition, the Receiver may well get a positive consequator in return from the Emitter for giving the bread or answering the question. That positive consequator may be nonverbal--some money--or verbal--a "thank you."

In short, the exchange between Emitter and Receiver can include a variety of verbal potentiators--mands--and verbal consequators that they strengthen--or that strengthen the verbal potentiators. To recapitulate, the Emitter may be consequated for producing a potentiator (mand) for the Receiver by what the Receiver then does, and thus the Emitter's behavior in producing that (or a similar) mand is likely to recur. By reacting affirmatively to the Emitter, the Receiver is consequated by that reaction (which diminishes the potentiator that the Emitter has created), or the Emitter may provide a positive consequator directly. For example, E asks R a question (mand for R), R replies. The reply is a consequator for E's behavior of asking the question, making it more likely E will ask R questions. E asks the question because E lacks some particular information (mand for E). R answers the question to avoid embarassment (silence or indication of ignorance); this avoidance consequates R's behavior of replying to the question. E thanks R, another consequator for R's behavior.

The mand category in verbal behavior is characterized by the primary functional role of the controlling variable described as a potentiator, by the explicit consequator that a mand strengthens, and by the mand's susceptibility as an effector to being consequated itself. In addition, mands as verbal effectors are subject to being made more likely by either verbal or nonverbal consequators. Mands are also characterized by the reduced importance of discriminators. A discriminator of an environmental component may not be reflected in E's verbal effector at all, as in "Run!" or "Help!" There may not even exist a discriminator originating from an external Receiver. Nevertheless, on occasion mands are combined with discriminators through tacts (to be described shortly); that is, the same verbal effector contains both a mand and a tact, much as in behavior in general the functions of potentiator and discriminator can result from the same stimulus input.

Emitter/Receiver. Mands may be "self-mands" (Skinner, 1957, p.440). One says to oneself, "I must do this" or "I ought to go home" or "I should not act like this"--perhaps aloud, usually silently. These seem to exert considerable control over our behavior--as part of behavior itself. They set self-goals, whose attainment is a consequator then responsible for the action or inaction that the self-mand may specify. Self-mands presumably account for the use of such constructs as "will" and "conation,"

though these have not benefited from an operant analysis. Many self-mands derive from the "verbal community" and the culture in which it is embedded. That culture's precepts and commandments, its mand-oriented rules, become self-mands (a conscience) for individual behavior, including verbal behavior—such as telling the truth, or refraining from using certain words in talking to certain Receivers. As Skinner indicated, self-mands may be acquired through imitation of another's mands or overt self-mands (a form of modeling). A genuine promise or threat is a self-mand as well as a mand to another who may have agreed to do something in exchange or must do something to remove the threat. One also mands onself when one asks oneself a question; the self-answer is the consequator for having done so.

Some mands emphasize the behavior that will result in the outcome that as consequator the mand strengthens, some emphasize that outcome, and some both; the last may be the most effective. Setting a goal emphasizes the outcome but may instead, or also, specify the performance to achieve it (Locke and Latham, 1990). Among those mands that emphasize the behavior is an "intention," as in saying one "intends" to do so and so. This is primarily a self-mand, with the Emitter and Receiver in the same person, in contrast to goal-setting, which can be either a self-mand or a mand for another person. "Intentional" behavior has been emphasized in recent (and past) years by some philosophers and psychologists (e.g, Dennett, 1978) apparently without examining it adequately by anchoring "intention" to observable (or subjectively experienced) behavior through its functionally controlling variables; it is as though an intention originates simply from some inner person or homunculus. Rather, as a mand an intention results from a combination of some discriminator and a positive (future) consequator.

An intention can be verbalized aloud or silently or in writing for either public Receivers or for oneself. As a potentiator (e.g., in a New Year's resolution) an intention is stronger when it verbalizes specific behavior (e.g., "I intend to drink only one martini before dinner" rather than "I intend to stay sober"). That seems true for all mands, including exhortations. "Slow down" presumably has more effect than "Drive cautiously" (and "Just say No" more than "Abstain," though probably not much). Specificity of subsequent outcome also is presumably more effective than generality. Though as noted above some actual outcome is what primarily consequates the behavior of saying or writing a mand, for self-mands that outcome may be simply the relief it brings to the Emitter/Receiver from saying or writing it. Indeed, that consequator may simply strengthen the verbal effector. However, if the goal specified in an intention fails to materialize because the required nonverbal behavior is missing, this type of self-mand generally is more likely to descend to a region paved by predecessors.

Tact

In another category of verbal behavior, in which the Emitter may describe something, the primary functional role is played by discriminators. Something in the environment (a chair) or in the

person (a foot) enters an individual's sensory system and becomes a discriminator as a selective input (stimulus) for some behavior, largely through differential consequation of an input-effector combination. This effector may be nonverbal; for example, the individual reaches toward or touches the chair or foot instead of something else, or nothing. A verbal effector may accompany or follow this nonverbal one, or it may be the only effector. Whichever of these, it names or describes the discriminator. That name or description, "chair" or "foot," becomes a verbal discriminator for a Receiver, a substitute for the directly sensed chair or foot. There has to be some consequator to make the input selective of one behavioral effector rather than another, verbal or nonverbal. When the Emitter's behavior is verbal, the consequator for a particular discriminator-effector combination may emanate from a particular Receiver, possibly in a dialogue, or from many Receivers, as when a child grows and is acquiring verbal effectors, e.g., words for objects, as well as consequators from multiple Receivers.

Emitter. Though the consequator for the Emitter's verbal effector may be nonverbal, such as a Receiver's attentive orientation, it is likely to be verbal, some Receiver comment. What gives that comment its strength to consequate the Emitter? There may be no apparent potentiator, no mand--no deprivation or aversive stimulation of the Emitter--for a verbal effector that simply describes a scene or names something. Instead, the comment very probably becomes a consequator and leads the Emitter to say more because it is associated with the particular Receiver, who in turn is associated through generalization with various effective consequators in the Emitter's experience. Evidence of such generalization becomes apparent from its absence when one finds onself among complete strangers. Dialogues do not proceed beyond a few words or even start easily, as in leaving or returning to an apartment or office by elevator. Silence. Or, "It looks like rain." "It sure does." End of dialogue.

Receiver. Turning the coin, what might consequate the Receiver for emitting a consequator to the Emitter? For parents and teachers as Receivers there probably exist explicit mands, external and internal, that create consequators for the behavior of consequating a child's commentary. In a dialogue one person can ask another a question (a mand/potentiator) to which the Receiver replies with discriminator-dominated verbal behavior. A culture can create a collective mand--a "rule"--that children and adults alike should answer questions. Though mands are often mixed with this second category of verbal behavior being discussed here (as potentiators are mixed with discriminators--see earlier), the key variable for classifying the category is not the potentiator but the discriminator, connecting the verbal effectors of the Emitter with the nonverbal world. They also connect the Emitter with the Receiver other than through consequation and potentiation, for the Receiver becomes one of the discriminators accounting for the Emitter's behavior. (A friend in the apartment house elevator is a positive discriminator, a stranger a negative one.) The Emitter is differentially consequated for emitting verbal effectors in the presence a particular Receiver as well as for emitting these about a particular some-

thing. Skinner (1957) called this category of verbal behavior a tact.

Significance. Tacts are particularly significant in any analysis of verbal behavior for several reasons. They get the most attention from psychologists and linguists--often to the exclusion of other categories. Because they describe the world and what goes on in it, they constitute the principal ingredients of communication and are assumed to comprise "information." Their computer software equivalents are "data." They are where human mistakes, deceptions, and other distortions in communication are most likely to occur--where Emitter and Receiver, for example, are likely to be reacting to different discriminators. In addition to the Emitter's tact of some environmental event or condition, the Receiver may have received other, related tacts from the Emitter or other Emitters and may be receiving discriminators about the Emitter and the Emitter's behavior pertinent to the tact, all then affecting the Receiver's reaction to the tact. Indeed, the Receiver may discriminate not only the tact (verbal effector) and perhaps the event or condition that occasioned it, but also a consequator that influenced the Emitter's verbal behavior and even the potentiator that accounted for that consequator. Such multiple discriminations (e.g., of context) by the Receiver figure importantly in the Receiver's reaction to tacts that embody deceit or error.

The tact has two other significant aspects. The Emitter may tact some aspect of the environment, including himself/herself. "We may tact our own behavior" (Skinner, 1957, p.314). This topic (reference) can be external to his/her skin and thus visually or audibly accessible to another person, or internal and this invisible. As indicated in the section on Media, verbal behavior--including tacts--can be aloud (overt), silent (covert), or in writing (overt or covert). Combinations of these two features include external (topic) and overt (medium); external (topic) and covert (medium); internal (topic) and overt (medium); and internal (topic) and covert (medium).

Emitter/Receiver. One may talk to onself instead of to another, or along with another (Skinner, 1957, pp.163, 394) and may do so silently (p.438). "A man may usefully 'speak to himself' or 'write to himself' in the form of tacts" (p.440-441). When the Emitter and Receiver are the same person, a tact is a "self-tact" (p.441). Self-tacting adds another binary aspect to the two above. (This is also true of mands.) Now a tact might be considered as occurring in six combinations of topic (T), medium (M), and Receiver (R): (1) externalT/overtM/otherR, (2) externalT/overtM/selfR, (3) externalT/covertM/selfR, (4) internalT/overtM/otherR, (5) internalT/overtM/selfR, and (6) internalT/covertM/selfR. Two other combinations are self-excluded, externalT/covertM/otherR and internalT/covertM/otherR, since a covert effector cannot be coupled with another person as Receiver. Non-problematic are (1) and (2), in which an Emitter talks about external objects or actions, out loud, to another person or himself/herself. But in (3) an Emitter silently self-tacts external objects or actions, that is, talks about them silently to himself/herself; an observer may have sensory access to the external objects/actions but not to the Emitter's silent

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self-talk--which the Emitter may report aloud to a Receiver. In
(4), an observer (as an R) does not have sensory access to the
internal conditions/behavior of the Emitter but does receive what
the Emitter says or writes (tacts) about them; however, whether
what the Emitter tacts about them is reliable depends on how much
access the Emitter actually has to these, and how valid these
tacts are depends on how well the conditions/behavior can be
discriminated and how adequately they can be tacted--a matter of
much uncertainty and investigation. In (5) are found the same
difficulties as in (4) and in addition R does not receive what
the Emitter reports--but conceivably could subsequently if what
the Emitter says is recorded or what the Emitter writes is made
public. In the last combination, (6) internalT/covertM/selfR, the
Emitter silently self-tacts what is occurring inside his or her
body, including the head, and an observer has no access; this may
define "consciousness." If the covert self-tacts can be converted
into overt tacts transmitted to the a Receiver (observer), combi-
nation (6) resembles (4). These variations will be discussed
further in a special section on Encephalic Behavior.

Interverbal

This category of verbal behavior consists of interactions
between components of verbal behavior where one component
accounts for another; one occurs only because the other occurred.
Hence the "inter" in Interverbal. (Interactions of another kind
within verbal behavior are discussed under Autoclitic in the next
section.) Following Skinner's (1957) taxonomy, three subcatego-
ries are Echoics, Textuals, and Intraverbals. A fourth, Reinfor-
cers, provides explicit membership in the taxonomy for verbal
effectors that function as consequators for other verbal effec-
tors. The entire category of interverbals has been relatively
neglected in linguistic and psychological analyses despite the
need to distinguish it from tacts and mands.

   Echoics. In this subcategory are verbal effectors that simply
copy or mimic other verbal effectors, in the same vocal/auditory
medium. The Emitter's output and the Receiver's input/output have
a one-to-one relationship. The Emitter's output can consist of
either a mand or a tact, as well as autoclitics. An Emitter's
output may copy itself. Some echoic behavior may have either
verbal or nonverbal consequators, as when a Receiver is praised
or paid for copying a tutor (Emitter) in systematically learning
a new language or for quoting a speaker on radio or television.
Other (i.e., verbal) consequators may be difficult to identify in
much of such imitation. Consider the infectious phrase "you know"
that currently seems omnipresent among American speakers of
English of all ages and educational levels. This minor verbal
plague might be considered an example of modeling behavior that
otherwise accounts for much useful, "inadvertent" learning of
language in both children and adults. A significant kind of
echoics is the silent variety that occurs as part of listening
and can be reproduced aloud subsequently.

   Textuals. This is the printed equivalent of echoics, epitom-
ized in printed quotation, including plagiarism. The relationship
between Emitter and Receiver is likely to be mediated by a

mechanical, electrical or electronic artifact, e.g., word processor. Various errors and self-corrections provide evidence of covert (self-talk) behavior here as in other writing and typing.

Intraverbals. In this subcategory one verbal effector determines the likely occurrence of another that is different though similar. Examples include translation and paraphrasing between Emitter and Receiver as well as thematic clusters and word chains or counting (not to be confused with grammatical arrangements) within an emission. Receivers often confuse intraverbals with tacts, to the detriment of accurate communication. A tact reports a discriminator directly, but an intraverbal reports what the tact's Receiver then reported as the discriminator, often as if it is a direct report, without attribution to the source. The Receiver of the intraverbal may never discover the information was second-hand and perhaps distorted.

According to Winokur (1976, p.101), "Intraverbals must constitute the biggest class of verbal operants, for almost nothing that is said seems to be completely free of intraverbal controlling relations." The same author (p.104) would classify "you know" as intraverbal "Filler, verbal junk, and verbal clutter" that "are parasitically maintained by the terminal reinforcement for the later components of the chain." This last comment partly resolves the question how are such intraverbals as verbal effectors are related to consequators as one of the controlling variables in the operant paradigm. In this respect, perhaps one word in a chain or cluster, or to be translated or paraphrased, functions as a discriminator (often in combination with others, as context) for another.

Reinforcers. Mands are potentiators. Tacts are products of discriminators sensed by Emitters and are discriminators themselves for Receivers, and intraverbals are discriminators for other intraverbals. But where is the verbal parallel for consequators? Despite the critical role of consequators as one of the four controlling variables in his overall operant model, Skinner (1957) did not label such feedback as a separate category or subcategory in his taxonomy of verbal behavior, although he did, of course, repeatedly refer to verbal consequators as well as nonverbal ones in explaining verbal behavior functionally; that is, he mentioned some consequators, mostly negative ones, that are both verbal effectors and consequators of other verbal effectors. These constitute here a proposed additional category within interverbals. The term reinforcer is operant psychology's overall term for what is called consequator in this report.

Reinforcer feedbacks are found in Emitter-Receiver exchanges in both spoken and written media, and in the other verbal categories. They occur not only between individuals but also within self-talk. "A man talks to himself because of the reinforcement he receives" (Skinner 1957, p.163). They include types in addition to the obvious "good," "bad," "right," "wrong," and the like in an E-R interaction, as verbal consequators of either verbal or nonverbal effectors. In emphasizing negative consequators, Skinner (1957) pointed out that such consequators may be nonverbal (the messenger was killed or the child was spanked) for verbal behavior, or verbal (threat, ridicule, criticism, or simply silence), incurring a tact's suppression, avoidance, termina-

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tion, reduction to just a whisper or to self-talk, or deceptive distortion (lying).

Some feedbacks occur as intrinsic aspects of an Emitter's output. One presumed positive reinforcer is the completion of a verbal effector of some length, such as a vocal sentence or speech or a written paragraph or document. This "closure" reinforcer may be especially effective if the content includes a mand, tact, or interverbal that is otherwise consequated. The notion that content of verbalization may itself consequate the verbalization positively should be explored further. An Emitter may be more likely to talk or write about hedonically enjoyable matters than about emtionally neutral ones--about food if food-deprived, sex when abstinent, home if long away. This is hardly a novel notion. What is pertinent to the present analysis is the hypothesis that the verbalization of the missing positive consequator--more than the potentiator (deprivation)--is what accounts for the verbal behavior.

Similarly, mention of events or behavior having negative consequators--aversive consequences--mild or strong punishment--discomfort or displeasure--may function to inhibit or minimize the occurrence of tacts that include them. Further, some negative consequators presumably arise within a tact for other reasons. One might be some effort in extended or complex or difficult verbal behavior--in a word, sentence, paragraph, or longer. Zipf's law of least effort suggests this effect. So do various readability formulas that try to measure the different sources of difficulty in text, such as nouns instead verbs, passives instead of actives, long sentences instead of short ones--all of these being structural variables (including format factors) contributing probably as much to the required effort in reading text as to a lack of comprehension.

Autoclitic

Like the human body, in many respects verbal behavior must be coordinated and organized. Verbal components in the categories of mand, tact, and interverbal can be functionally useful in them-selves; in a sense they can be autonomously "meaningful." But many words, or parts of words, or ways of combining words with words or sentences with sentences, are useful only for relating components to each other in some fashion. They are analogous to the human body's bones, sinews, and ligaments and their coordination role. Without them the muscles could not operate or operate together; in themselves an essential functional role they play is to relate muscles to each other. That role, hardly a trivial one, is only one aspect of the human body (including the head and its contents) construed as a complex of interacting systems and subsystems, with many relationships between them and within each. It seems reasonable to regard behavior, i.e., human-environment interactions, as one of the body's systems with its various subsystems and many relationships between them and within each. Verbal behavior is one of those subsystems, with a number of components that have been reviewed in this article and relationships within these. As Wogalter (1976, p.115) observed, "like nonverbal behavior, verbal behavior is multicontrolled."

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Relationships. In an Emitter-Receiver dialogue E may emit one category of verbal behavior and R may reply with another. For example, E may ask R a question (a mand) and R may react with a tact, which is thus functioning as a positive consequator for E's mand. Or E may emit a tact and R may respond with a question. R may repeat, paraphrase, or translate (interverbals) E's tact. In many all such cases R's effector may be either aloud or silent, written for public consumption or for onself in a self-dialogue. E may also engage in such self-dialogue--for example, asking himself or herself a question (covertly) and emtting a tact (overtly). In addition, E may alternate between media, as in reading aloud a typed text.

Indicating further the complexity of verbal behavior, there are relationships expressed verbally between words, between sentences, between longer segments, and between parts of words, whether in mands, tacts, or interverbals. The forms in which they are expressed vary. Some forms consist of single words (or phrases) such as conjunctions, prepositions, and articles, meaningless in themselves. Some are symbols, notably in mathematics and the punctuation in writing. Others consist of arrangements among words and sentences, various groupings and combinations or "frames," and various ways of sequencing or ordering words, phrases, clauses, or sentences. Arrangements and single words may be alternatives for handling the same relationship. Tables, lists, and charts are other kinds of arrangements interrelating verbal components. Formal arrangements in sentences are often labelled as syntax. In addition, words are interrelated by grammatical tags attached to them. These various relational methods provide a structure into which an Emitter fits the "raw" or "primary" functional components of verbal behavior that this report has outlined. This "framework," as Skinner (1957, p.349) called it, facilitates the emission of longer segments of verbal behavior, as obvious in vocal discourse or written composition. Skinner labelled these methods "relational autoclitics." In a sense they are the joints, ligaments, or sinews of language and parallel the ways in which muscles are related to each other in executing various motor acts. A term for them better than auto-clitics could be "relators."

Relators. These relators enable an Emitter to tact relationships among components of the environment and of the Emitter's own behavior, beyond the tacts simply designating an object, condition, event, or characteristic. Such relationships include those labelled as spatial, temporal, same/different, inclusive or exclusive, causal, correlative, connective, and combinational. Autoclitics of this nature also enjoy a life of their own. They enable such verbal behavior as inferencing, reasoning, and logic, as well as word play or manipulation for inventing and imagining environmental components and relationships, including those concerning the Emitter's behavior. Skinner (1957, p.332) emphasized distinguishing the referential from the autoclitic function in particular terms. An environment's objects, conditions, events, and characteristics can be sensed, discriminated, and tacted, and so can some of the relationships among them at times. Autoclitic terms as elements of the verbal system enable one to discriminate those relationships better and to verbalize others.

In interverbal behavior they relate verbal effectors to one another, in daily discourse or in logic; as Skinner commented (1957, p.329), "Logic is concerned with interrelations among autoclitics, usually without respect to the primary verbal behavior to which they are applied." In a conversation an Emitter is likely to mix the referential support with the interverbal autonomy.

Like all verbal effectors, autoclitics are influenced by consequators and discriminators, presumably indirectly as parts of mands and tacts. As will be discussed in more detail later, rules in verbal behavior generally embody autoclitic relationships, whether the rules are tact-oriented or mand-oriented. Computer software creates information out of data largely by means of the software equivalents of relational autoclitics. Communication accuracy, including errors or deceit, can depend on how the autoclitics have been manipulated by an Emitter or how well the Receiver has matched them with his or her own repertoire of this kind of behavior.

Qualifiers. Skinner (1957) placed the autoclitic label on another kind of verbal behavior in which an Emitter may "talk to himself about talking," in a sense, to affect the Receiver's behavior in some fashion. The Emitter tacts what he or she is saying or about to say and modifies it in some way to influence his or her verbal relationships with the Receiver. For example, the Emitter may add something about the source of the effector, e.g., "I read that...."; may indicate the effector's strength or adequacy, e.g., "I believe that...." or "I'm sure that...."; may "describe relations between a response and other verbal behavior of the speaker or listener" (p.316), e.g., "I agree that...." or "I admit that...."; may "indicate the emotional or motivational condition of the speaker"; may tell the Receiver that the verbal effector has already been said or constitutes some subordinate item, e.g., "for example"; or may qualify the forthcoming effector, e.g., "seriously". The Emitter may modify "the intensity or direction of the listener's behavior" (p.322) by inserting a negative (No, Not, Never, or Nothing), or may weaken or "strengthen his reaction to the response which it accompanies" (p.326)--a tact or an intraverbal. It may weaken it by some expression of approximation, such as "sort of." It can strengthen it by some expression of assertion, such as "definitely"; the verb "is" (with its variations) constitutes another method of assertion (a mand-like addition to a tact). This category of autoclitics seems to differ somewhat from the "relators" described first and might be more appropriately labeled "qualifiers." By emitting "a property of the speaker's behavior or the cirumstances responsible for that property" (p.329), they modify or qualify the Receiver's reaction to what the Emitter says.

DISTORTIONS

Now that the operant paradigm and the verbal taxonomy to which it applies have been presented, let us consider accurate communication. As said at the start, it will be analysed in terms of _inaccurate_ or invalid communication, by examining the kinds of distortions to which communication between Emitter and Receiver

can be subject. The predominant linkage among them is a discrepancy between a discriminator as verbalized in a tact by an Emitter and a discriminator as verbalized in a tact or an intraverbal by a Receiver. That discrepancy, which may include an autoclitic, was labelled by Skinner (1957) as a "distortion." It is not necessarily a distortion of the "truth." The Emitter but not the Receiver may be verbalizing an accurate account, or vice versa. Either may verbalize an inaccurate one. Both may be accurate. Both may be inaccurate. The Emitter transmits a tact both to the Receiver and to himself or herself; the accounts may not be the same. The Receiver verbalizes an account to himself or herself and may transmit the same or a different one back to the Emitter, or elsewhere.

Modification. One kind of discrepancy or distortion is modification. The Emitter or the Receiver summarizes, abstracts, paraphrases, recodes, emphasizes, analogizes, minimizes, or restructures (by filtering, conversion, or substitution) the discriminator in transmitting a tact or intraverbal to the Receiver. The Receiver may do the same in receiving it as an intraverbal and comparing it with a discriminator acquired directly either at the same time, earlier, or later. The controlling consequator for the Emitter in making such modifications is likely to come from a Receiver as a positive one for making the transmission speedy, clearer, and more understandable due to what the Emitter has added, subtracted, or changed; the Receiver may or may not discriminate the distortion. There is no positive consequator otherwise for the Emitter, no "ulterior motive," or at least the Receiver discriminates none. The Receiver is consequated positively in various ways, by acquiring information or being entertained, and is not damaged, offended, or stressed.

Origination. Another kind of distortion is origination. The Emitter creates an imaginary tact, a fantasy, in fiction, poetry, drama or film, which does not pretend to be an accurate communication about some reality; as Skinner (1957, p.150) noted, the writer usually arranges through various devices so that "the reader distinguishes between fiction and non-fiction." As Skinner further described it in more technical terms (p.149), the verbal effector occurs in the "absence of circumstances in which it is characteristically reinforced." The Emitter's verbal behavior is positively consequated by the Receiver, who has acquired or can acquire no discriminator of his or her own with which to compare the Emitter's tact--except the Receiver's own fantasy. The Emitter has no other positive consequator except an instrinsic one from his or her creation. However, the imaginary tact must bear some resemblance to reality for it to have been originated at all. It differs in concept or details. The closer a particular imaginary tact comes to resembling the Receiver's discriminator of reality, the more likely will be the Receiver's verbal comparison between that tact and the Receiver's own discriminator. The Receiver then may reclassify the imaginary tact as a modification, error, or deceit.

Persuasion. A third kind of distortion occurs in persuasion. The Emitter includes emotional components in a tact, to induce the Receiver to buy something, vote for someone, or otherwise do something. This sort of communication exploits some respondent

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behavior or attempts to condition that behavior according to the respondent (Pavlovian) paradigm. It is evidenced in a Receiver's smiles or laughter, tears or sadness, indignation or anger, fear or anxiety. It is briefly mentioned by Skinner (1957, p.154) in terms of "special reinforcement for the Listener's emotional behavior.")

Evaluation. A fourth kind of distortion occurs in evaluation, incorporated in a mand that tells the Receiver he or she ought or ought not to do something; the evaluation is frequently moral. Evaluation is often mixed with persuasion. As in persuasion, evaluation is likely to incorporate some distortion of a tact, a distortion that would be classified as error or deception. These two distortions of tacts, deceit and error, are now analyzed at greater length. As already suggested, they can occur in the behavior of either the Emitter or the Receiver, in either the spoken or the written medium (and in other media).

Deception

Parsons (1989) distinguished two types of verbal deceit, lying (falsification or misinformation, and concealment (withholding, or non-information); the latter can also be called lying, or passive lying--or at least not telling the truth. In court a witness swears to tell "the truth, the whole truth, and nothing but the truth" (though there may also exist a "right to remain silent"). A contemporary version of concealment is a claim of faulty memory, which no matter how convenient and unlikely, unless shown to be false--often a difficult demonstration--is not regarded as illegal and perhaps not even unethical.

Falsification. Lying as falsification comes in several forms. One is substitution or alteration, another invention. The liar produces a tact about an event or situation (perhaps about his or her own behavior) that is not congruent with it, that is, the liar's tact does not match the tact emitted by others given greater credence for various reasons. Alternatively, the liar emits a verbal effector describing an event or condition that does not or did not exist at all according to others given greater credence, again for various reasons. Apparently because in the latter case there is no discriminator to account for the verbal operator, Winokur (1976) preferred to place lies in the mand rather than in the tact category, contrary to Skinner (1957), who included them among "distorted tacts." A third form of falsification is exclusion. An individual simply issues a denial using an autoclitic of negation. It may even be a denial of lying.

Concealment. This has been less examined from an operant perspective, presumably because the Emitter "does nothing"; the Emitter is an omitter. But inaction is still a kind of behavior. The Receiver's problem is identifying the discriminator about which the concealer remains silent and then matching the Receiver's own discriminator against it. A gap in information seems more difficult to discern because a context of stimuli must be examined, not just a particular stimulus. Hearst (1991) recently described research showing that "animals and human beings have surprising difficulty noticing and using information

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provided by the absence or nonoccurrence of something" (p.434).
The Receiver may have to match tacts from his or her array of
discriminators against the Emitter's verbal effectors, none, few,
or many, to discover what is missing. The task becomes easy only
if the deceitful Emitter has emitted none or if the Receiver has
acquired some clue as to what the Emitter has omitted.

Emitter. The important issue is how to identify the control-
ling variables for Emitter behavior and Receiver behavior. The
Emitter's deceit behavior is attributable ultimately to some
positive consequator, either gaining something or avoiding or
terminating something; it is constrained by the possibility of
detection and then of punishment, a negative consequator. Decep-
tion becomes more frequent in contexts where these somethings are
of greater moment, notably in contentions between individuals or
groups involving money, votes, potential injury or death,
ideology, sex, status, or control over others; such conflicts or
competitions are rife with potentiators. But especially if the
"somethings" gained or avoided have not yet occurred when the
deceiver lies or conceals, there must be some further process to
account for the lie or concealment. It can be presumed this is a
self-mand to emit that verbal effector rather than an actual
tact. This is congruent with Winokur's (1976) classification,
noted above, of a lie as a mand. That self-mand would be self-
described by the Emitter (and others) as an intention, analyzed
earlier in the description of mands. The consequator for it is
the verbalization of its eventual outcome, a something that gains
or escapes or avoids, an interverbal reinforcer.

The deceitful Emitter "knows" he or she is lying or withhold-
ing. That is, the Emitter tacts covertly to himself or herself
the discriminator of the actual event or situation but emits a
verbal effector different from that covert tact, or foregoes
making that tact overt; and further, in self-talk, the Emitter
discriminates that difference or omission in his or her own
behavior. The self-talk is silent, though perhaps subsequently it
may become public in a confession under threat or torture or if
the deception is discovered. Such discovery is a negative conse-
quator of deceit behavior. Its possibility, along with community
rules that have become self-mands about permissible behavior,
deters lying or concealment unless their positive consequators
(including amounts, likelihoods, and latencies) have a competi-
tive edge.

Receiver. The Receiver (in a dialogue or as an observer) may
"believe" the Emitter, that is, the Receiver acts in accord with
the Emitter's verbal effector, largely because in our daily lives
as Receivers we are consequated positively for acting in accord
with many Emitters' verbal effectors as discriminators for our
behavior--an explanation of "believing," i.e., "belief." Life
would be too complicated otherwise, though some are more gullible
than others. Skeptics and cynics are in the minority in some or
most communities. In addition, a Receiver apparently engages in
considerable echoic and textual behavior when listening and
reading, covertly repeating what the Emitter said or wrote. If
the Emitter lies or withholds, then so does the Receiver--further
basis for "belief." The Receiver will be more gullible or less so
depending on cultural practices and prior experience (condition-

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ing).

But there can be reasons why the Receiver does not behave just like this on some occasions. Probably the most influential is some misfortune the Receiver experiences because of the deception, a negative consequator of the behavior induced by the deception or a positive consequator unattained, in combination with some good fortune the Emitter had because of the deception, that is, a positive consequator attained or negative consequator escaped or avoided; as Skinner (1957, p.149) said, the Emitter's "distortion of verbal behavior" has "exploited" the Receiver. The exploitation becomes a discriminator to the Receiver.

Detection. That revelation can occur when or after the Receiver tacts a pertinent discriminator of the subject of the lie or concealment, or acquires a tact from elsewhere, and if either tact (or both) differs by substitution or addition from the verbal effector received from the Emitter. Independently or along with the exploitation, the discrepancy functions as a discriminator for the Receiver, who then disputes or seeks more information from the Receiver. As Parsons (1989) suggested, though lacking direct access to the Emitter's covert behavior, the Receiver can discriminate similar behavior on his or her own part and may generalize this to the Emitter--an "attribution" of "intention." The Receiver may observe facial expressions or gestures or hear vocalizations accompanying the lie that the liar does not (Ekman, 1985; Ekman and O'Sullivan, 1991). These have been interpreted as motor accompaniments of respondent behavior in autonomic processes rather than as components of the operant behavior addressed in this report. In another detection mode, acting first as Emitter the Receiver as prosecutor, parent, spouse, or customer may question the Emitter to evoke inconsistencies in tacts. Also acting first as Emitter, a polygraph examiner may impose mands on the subsequent Emitter--particular queries or instructions--to elicit autonomic responses often accompanying a lie or a concealment in individuals influenced by a culture in which these are regarded as immoral, and in which possible detection is threatening (Ben-Shakhar and Furedy, 1990; Lykken, 1981). Queries embodying tacts occur in a "Control Questions Test" (CQT) or, less often, in a multiple choice "Guilty Knowledge Test" (GKT). As will be pointed out later in the section on Encephalic Behavior, from a behavior-analytic point of view the queries could include not only interverbals based on discriminators that the Emitter could or could not have received but also the Emitter's possible consequators and their nonverbal potentiators accounting for a lie or concealment. Detectives and procecutors in courts and fiction often focus on these variables as "incentives" and "motives." Polygraph queries based on Skinner's analysis of verbal behavior might also probe the self-manding in which the liar is presumed to engage.

What are the positive consequators for such Receiver-as-detector behavior? When the Receiver is a professional, they are the usual ones for performance, including financial gain and advancement. Indeed, due to these some of a Receiver's verbal behavior may on occasion itself include lies or concealments. These can then evoke distortions in the verbal behavior of the Emitter, though not as easily as nonverbal behavior such as does

physical punishment or detention.

Self-Deception. In short, the behavior of the Receiver in deception-detection processes is interlocked with that of the Emitter, as in other verbal processes and as emphasized at the start of this article. What then is "self-deception"? In accord with the foregoing analysis, it takes place within an individual as both Emitter and Receiver. The Emitter tells himself or herself that something is there or happened when it is not there or did not happen--or vice versa. Although it might more appropriately be classified as "error" and discussed in the next section, this may be a good place to consider it. Let us presume that the Emitter could and does receive a valid discriminator from the environment but instead sends an incompatible verbal effector to himself or herself as Receiver (and perhaps to other Receivers). That incompatible effector's discriminator may result through stimulus generalization from some special or partial aspect of the environmental event or situation. If this is strengthened by some strong consequator or other circumstances, the incompatible effector predominates in competition with a potential valid tact to produce what is called an illusion. Some internal process involving autoclitics, respondents, and/or past experience might contribute to what is called a delusion. In either case the individual says it's for real. Another form of self-deception might include denial, a kind of self-silencing due to some negative consequator. What seems to distinguish self-deception from deceiving only others is the absence or weakness of a valid discriminator and the absence of a self-mand to fabricate or conceal something. Self-deception presumably can develop because a valid discriminator weakens with the passage of time or because self-silencing grows stronger due to newer circumstances. In addition, self-deception may follow from the self-manded deception of others. An observer may find it difficult to tell these two types of deception apart.

Non-Tact Deceit. All of the foregoing analysis of deception pertains he category of verbal behavior called the tact. But deceit can also occur in mands, as in empty threats and false promises (to others in contracts, agreements, loans, and marriage vows) and to oneself (in false intentions, false hopes, and wishful thinking). And in echoics or textuals, as in substitutions, alterations, inventions, and omissions. And in intraverbals, as in lying about lying. And in autoclitics, with manipulations of these to change verbal relationships in various ways and thereby distortions of those relationships otherwise accepted as reflecting reality. And in reinforcers, as in false praise, flattery, or self-rationalization to avoid self-blame. The influences of the controlling variables in the operant paradigm still apply.

Error

Errors and error-making have always figured in psychological science, far more than has deceit. Much of the research in psychophysics, learning, and memory has concerned the mistakes humans and other organisms make, though "error" as such has been secondary in importance to the process in which it occurs. As a

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dependent variable for measuring some process it has taken a back
seat in operant research to rate or probability of behavior,
though some applied behavior analysis has examined the probabil-
ity of error. But error in itself as a distortion of or discre-
pancy from some requirement has been extensively investigated and
analyzed in the human factors domain of human-machine-environment
interactions. Little wonder! Errors occur due to the design of
machines and software, thus indicating the need for human factors
engineering. Training techniques try to fashion skills that
reduce errors, not just increase the speed or quantity of output.
Procedures accompanied by manuals and other performance aids are
established with aspirations to prevent mistakes in their execu-
tion. Personnel are be selected to exclude those whose inadequa-
cies might make errors highly probable. To prevent accidents,
safety experts would like to avert errors that could cause them.
Research in decision-making investigates mistaken decisions.
Every component of the human factors domain includes an interest
in error, in both research and applications.

Human factors interest in error as such has appeared in many
publications, e.g., Altman (1967), Fitts and Jones (1961),
Fleishman et. al. (1990), Harris and Chaney (1969), Meister
(1971, 1984), Morris and Rouse (1985), Norman (1980, 1981, 1988),
Rasmussen (1985, 1990), Reason (1990), Rook (1962), Senders
(1980), Senders and Moray (1991), and Swain and Guttman (1980),
as well as in human factors texts, e.g., Kantowitz and Sorkin
(1983), Sanders and McCormick (1987), and Wickens (1984).

Definitions. As Senders and Moray (1991) have pointed out,
there has been little agreement in defining "error" or "mistake,"
although most attempts have stated a discrepancy or deviation
from something. But what is the something? Candidates have
included truth, accuracy, tolerance limits, intention, expecta-
tion, rule, desirability, requirement, and correct goal, crite-
rion, choice, information, planning, judgment, inference, memory,
value, or decision. Left unsaid and unexplained is the source of
that "something," including what would have been "correct." In
recent years Rook's (1962) emphasis on "intention" has been
succeeded by a distinction between forming an erroneous inten-
tion, a "mistake," and faulty execution of that intention, a
"slip" (Norman, 1981, 1988), Morris and Rouse (1985), and Reason
(1990). On the other hand, a mistake as the violation of some
stated agreement may result from an "intention" to achieve some
other goal that seems, perhaps justifiably, to have a higher
priority. In this article's terminology, Norman's and the others'
"mistake" would be an erroneous "mand" or "self-mand." Self-
manding in planning a goal is incongruent with some other manded
goal (that might be a more effective consequator). The authors
cited have not traced "intention" to verbal behavior or explained
its source.

Categories. Some of the human factors literature has tried to
categorize errors, not functionally but structurally. Represent-
ative taxonomies have been reviewed by Fleishman et. al (1990)
more comprehensively than can be attempted here. Most taxonomies
have emphasized nonverbal rather than verbal errors. Categories
have included errors of omission, those of commission (e.g.,
pressing the wrong button), sequence errors (doing something in

the wrong order), and timing errors (too fast or too slow) (Swain and Guttman, 1983; Sanders and McCormick (1987); commission errors include substitutions and insertions. Errors have also been classified according to their location in a particular type or stage of processing information, e.g., Rasmussen (1985): skill-based, rule-based, and knowledge-based; and Parsons (1986): input, output, intermediate, sequence, feedback, aggregate, rule following, and relational manipulation. Another theme has been the source of errors. For example, the human in "human error" has been viewed as the designer of some equipment or software whose design occasioned the mistake, rather than the operator. Or as the trainer who failed to raise the skill level enough. Or as the manager who selected the wrong person. Not the equipment operator but some external factor has been identified as the causal agent. It has become apparent that contributions to error or to a particular error can come from many sources, human, hardware, software, the environment, and errors can vary greatly in form and impact. Various "performance shaping" factors have been listed, including motivation, though except in studies of training this has been seldom if ever elucidated in terms of the controlling variables described in this report. In some product liability litigation, one attorney may attribute an operator's error resulting in an accident to equipment design whereas the opposing attorney will blame the operator, or perhaps inadequate training.

As indicated above, most of the human factors analysis of error until recently was focused on perceptual-motor performance, including feedback and recovery from errors in such performance. The emergence of computer data processing and programming as a human factors interest has led to research on error incidence and causes in verbal performance, both in programming and by computer users. Here not only is the human's behavior verbal but also in a more limited sense is the computer's. The user as Emitter gives commands, queries, data, and feedback to the computer as Receiver, and the computer as Emitter transmits to the user as Receiver the same categories as well as prompts, explanations, advisories, and diagnostic warnings. Errors can and do occur in all of these, on the part of both user and computer. Human factors efforts are being directed toward reducing these, and also toward computer presentation of feedback about a user's error so that feedback will not function as a negative consequator (Badre and Shneiderman, 1982). That term is not employed, however, and the analyses have not been oriented toward a behavioral framework.

Other contexts where human factors research has examined errors in verbal behavior have included typing (Grudin, 1982; Rabbitt, 1978), proofreading (Wright and Lickorish, 1983, 1984), and "duplicatory transmission"--copying (Campbell, 1959). All of these include textual verbal behavior. The first reference describes four major categories of typing errors: substitution, insertion, omission, and transposition. Their incidence varies between expert and novice typists and between experts. Substitution errors in the samples tested mostly involved horizontally adjacent keys; "neighboring fingers share musculature, and postural compensations for finger movements may be similar for neighboring fingers" (p.130). Half of the insertion errors ("mis-

trokes") occurred because a finger hit two keys. The last reference holds particular interest; the author also examined "reductive coding" and translation, identifying a score of categories of "bias, distortion, or systematic error," including "distortion to please reader." Errors in decision-making have been a human factors interest as well; such behavior is primarily verbal. As already mentioned, verbal "slips" have interested Norman (1980, 1981), Reason (1990), and others.

Operant (Behavior Analysis) Research. Skinner (1957) described verbal slips in his analysis of "new combinations of fragmentary responses" (pp.293-304). Such slips or "lapses" illustrate what occurs "when two operants are of approximately the same strength at the same time" so "their responses seem to blend or fuse into a single new, and often apparently distorted, form (p.293). In addition to recombinations of syllables, words, and phrases, small fragments of words may be blended, indicating there are "minimal units of verbal behavior" (p.309) "which may be under separate functional control." These are illustrated by Freudian slips, though the control source may be otherwise difficult to detect. (Skinner's analysis was not mentioned by Norman (1988) or Reason (1990).)

Otherwise, except for some recent analyses of rule-governed behavior (discussed later), the error category of verbal distortion has received little attention in operant research. Salzinger (1991) pointed to this shortcoming in a recent address to the American Psychological Association. Error should be examined in the context of the controlling variables and Emitter-Receiver interactions outlined in this report, to fill gaps in both the operant and human factors domains, perhaps thereby bringing them closer together. The absence of motivational variables in human factors research (aside from training) has been suggested earlier. With the shift in emphasis in human factors (including training) from perceptual-motor to cognitive (human information processing) issues, feedback of any kind has been neglected. Norman (1981, p.11) observed: "The existence of feedback mechanisms seems a logical necessity in the control of human behavior (or almost any complex behavior, animal or machine). In cognitive psychology, feedback mechanisms have played almost no role, probably because the emphasis has been on the reception of information rather than the performance of acts."

Among the reasons for operant psychology/behavior analysis research in verbal behavior to incorporate the study of errors in communication are the following.

(1) Errors result from stimulus generalization and thus occur in antecedent discriminators. They can be removed by selective consequation, as has been done often in operant research with both humans and non-human organisms in nonverbal behavior. Such consequators are often supplied verbally by a Receiver for an Emitter's tacts.

(2) Subsequent discriminators are means of changing a person's behavior containing an error, including an Emitter's verbal behavior (tacts), to behavior without it, and these subsequent discriminators (information feedback) can be selectively strengthened by consequators. A Receiver often provides such subsequent discriminators verbally, whether the Receiver is another person

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or the same as the Emitter.

(3) A Receiver (including the Emitter in the same person) can be conditioned to detect (discriminate) errors in a verbal emission by receiving positive consequators for doing so (e.g., as in proofreading and editing).

(4) Errors result from response generalization (induction), including that in verbal operators. They can be removed by selective consequation, a process that takes place extensively in language acquisition and refinement.

(5) Some errors occur because of positive consequators--for example, a verbal or nonverbal consequator for speed of performance whereby accuracy suffers in the speed-accuracy tradeoff. A communications operator may make an "intentional mistake" (deviation from a prescribed procedure) to save time.

(6) As a deviation from some standard, an error (verbal or nonverbal) can be defined operantly--and thus operationally--as a failure to comply with a mand. Standards as "required" performance are mands. As such they can be either constant or occasional, in a person's own verbal behavior (self-mands) or as emissions from another or others, in parental control or a sermon, in rules of grammar or rules of legality, in design blueprints or in military regulations, in instructions stated in manuals or in those given to experimental subjects, and in warning on signs or labels. Mands and self-mands concerning standards and errors take two forms. In one an individual is manded to emit the correct verbal effector (a standard or goal). In the other, an individual is manded to avoid--or eliminate--a violation of the standard, an error. Associated with each of these kinds of mands and self-mands is compliance with the mand. Compliance as behavior is due to its controlling variables, including extrinsic and intrinsic consequation. Compliance with a self-mand seems to occur frequently in verbal behavior, as in self-editing of vocal or written matter. The educated writer has acquired self-mands about spelling, grammar, and punctuation from external sources of such standards. Non-compliance itself is an error, traceable to the controlling variables.

(7) Generally, an error functions as a negative consequator. Most individuals have been conditioned starting in childhood to react to making a mistake as though it were some kind of misfortune (as it can be if it leads to an accident), and one for which the person making the error is held responsible and blamed. As such, errors tend by themselves to condition behavior that averts making them, i.e., avoidance behavior.

(8) Errors as deviations from a norm are variations in behavior and may occur necessarily along with other variations when an individual is to acquire new behavior through shaping by environmental contingencies, that is, by selective consequation (much as genetic variations both deleterious and beneficial are necessary for evolution's selective process).

(9) On the other hand, Skinner and others have advised letting a person acquire new behavior without errors ("errorless learning"), for example, through operant shaping with teaching machines.

(10) Some errors can be explained as due to competition or conflict between incompatible consequators and their potentia-

tors.

(11) Some errors occur due to past conditioning (habits), both nonverbal and verbal, that are inappropriate for a current situation. Similarly, current conditioned behavior can be a mistake for a future situation.

(12) An error can occur in some aspect of a rule or in rule selection. Increasingly rule-following and rule-formation have been incorporated into operant/behavior analysis, as a subsequent section reports.

(13) Errors occur in echoics, that is, what is repeated deviates from what was heard, as in gossip, rumor, and misquotations (which can also be textual). A major but omnipresent kind of error occurs when a Receiver repeats an Emitter's tact echoically or intraverbally as though the Receiver himself or herself had seen or heard the discriminator: "It just rained in New York," not "My sister in New York called and said 'it just rained'." The autoclitic qualifier about the sister as the actual source is omitted, probably due to effort avoidance. Perhaps no harm is done if it actually did not rain in New York--but an autoclitic omission like this could be damaging if it resulted in relaying as fact an erroneous tact that could seriously misinform someone. In contrast, accurate echoic or textual repetition can at times prevent an error in a Receiver--through redundancy.

(14) Errors in tacts can be libelous if it is proved that the tact was due to some positive consequator (though not defined quite as such) for the tact Emitter. Errors in tacts do often result from positive or negative consequators for the Emitter. Such errors are demonstrated in psychophysics research, as shown by procedures used in signal detection theory. "Bias" in distorting a threshold is simply another name for a positive or negative consequator associated with a false positive or a miss.

(15) As Skinner (1989) pointed out in an admittedly belated analysis of "The Listener," one of the Receiver's behaviors in reaction to the Emitter is to "agree." What Skinner neglected to emphasize is that the Receiver may already have experienced something resembling what the Emitter is tacting, and the Receiver agrees or disagrees with the Emitter partly due to that past experience of consequated behavior (including tacts). If the Emitter's tact contains an error, the Receiver may agree verbally with the Emitter in an interlocked exchange that instead should function to minimize error in the Emitter; the agreement exacerbates incorrect communication. The Receiver may make a mistake in his or her own tact, or in interpreting (reacting to the autoclitics of) what the Emitter said or wrote. The exchange must then deal with either kind of Receiver error. Thus, consideration of errors further highlights the significance of the Receiver in human communication.

Comparisons between Deceit and Error

How can one tell a lie from a mistake? People do this all the time, yet in analyses of neither deceit nor error have there apparently been any attempts to compare them. They have much in common. Most obviously, each can distort a tact (as well as a mand, interverbal, or autoclitic). In such distortions of "infor-

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mation," each can include instances of either commission (including substitution and insertion) or omission. Each tends to incur disapproval or blame (negative consequation). In either the Receiver may or may not agree with the Emitter. But the Receiver, perhaps as soon as other Receivers, perhaps later (if ever), discriminates the difference between a mistake and a lie. So in general do others by giving each of these types of verbal behavior its own label; as an associated distinction, unlike "liar" there is no customary label for one who commits errors (though there is one for a person who discovers errors, an inspector, distinct from one who discovers lies, a detective).

One presumed explanation of the difference between deception and error and its evidence has been suggested earlier in the discussion of deceit in tacts. Deceit is "intended," errors are not. Translated to the terminology in this report, in lying the Emitter verbalizes a self-mand (or may even receive an external mand) to emit a verbal effector, the lie, that differs from the tact which the Emitter also self-verbalizes (usually covertly). This dual emission does not occur in the Emitter before a verbal mistake (though following or even during the mistake, the Emitter may discriminate the distortion and correct it.) The Emitter may well have a self-mand but it is a mand to avoid or eliminate the discrepancy, not, as in deception, to create one. This view differs from one mentioned earlier that a mistake is an erroneous intention. That view implies that all tacts, indeed all acts, are intended, that is, manded.

Though the Emitter of either deception or error may thereby benefit (by a positive consequator), that outcome is much more probable with a lie. An error—but not a lie—is likely instead to disadvantage its Emitter (with a negative consequator). The Receiver may be either hurt or helped by either an error or a lie (when truths can also hurt, some lies are beneficial). Above all, the Receiver's reaction is likely to be modified by an attribution or non-attribution of intent. The Receiver says it's intentional and a lie or not intentional and a mistake. Ironically, when a Receiver believes a lie, he or she is committing an error.

Clearly a considerable burden is placed on the Receiver for discriminating either a lie or an error or the difference between them. This requirement on the Receiver further illustrates the importance of the Receiver in Emitter-Receiver interchange. Lies and mistakes are often missed; as noted earlier, effective social relations depend considerably on the habit of believing the other, so credulity, even gullibility, may dominate. How can the Receiver distinguish between a lie and an error?

Probably not by discriminating that one is a distortion, since both are, and perhaps not by the extent of the distortion. Presumably not by discriminating directly an intention in one and not the other; without access to the Emitter's particular self-mand, that can only be inferred. As one source the circumstances around the verbal behavior at issue might suggest which is more probable. Another could be the history of the Emitter regarding deceit. As discussed earlier, other aid might come from collateral muscle or physiological responses—yet some could accompany verbalization about error as well as about deceit, since making a mistake may incur self-blame. By itself neither the gain (posi-

tive consequator) for the Emitter nor the loss (negative conse-
quator) for the Receiver might alone be sufficient. But if the
Receiver tacts both of these, the combination might force the
appropriate inference of Emitter intention (that is, of a self-
mand to deceive) or of its absence in making a mistake. The
Receiver's reaction could be a generalization from his or her own
behavior or from having observed others' behavior. An inference
would in turn require a Receiver to relate the Emitter's positive
consequator to his or her own negative consequator (and to other
factors). And that would depend on the Receiver's capabilities in
manipulating autoclitics, and in asking the Emitter questions
(mands). The process is complex. How often the Receiver is uncer-
tain whether a verbal effector is a lie or an error is unknown,
but apparently often enough to account for the phrase "an honest
mistake."

Distinguishing between deception and error presents problems
also when the verbal effector is an act of omission rather than
commission. Concealment is frequently excused by an Emitter as an
oversight, a mistake rather than intentional misinformation.
Nevertheless the Emitter's behavior may result from a self-mand
to omit a tact or part of one. On the other hand the Emitter may
have "forgotten" it. Then one must ask what roles mands, includ-
ing self-mands, play in forgetting or remembering things, includ-
ing verbal effectors and how such self-mands are or are not
consequated, positively or negatively. It may be difficult for
the Emitter to distinguish between self-talk without an omission
and self-talk with one. If it is difficult for the Emitter, it
could be doubly so for the Receiver.

In general, whether error or deception is involved, more
analysis seems warranted concerning the kinds of verbal behavior
labeled doubt, suspicion, skepticism, distrust, and disbelief.
These characterize the Receiver's countermeasures to deceit and
error. What are the controlling variables for such behavior?

Overview

At this point let us consider the various aspects of verbal
behavior in communication that have been analysed. They are: (A)
four variables in operant conditioning (plus others from respon-
dent conditioning, largely disregarded; (B) four categories of
verbal behavior plus some subcategories; (C) two loci of such
behavior, Emitter and Receiver; (D) six types of distortion, only
two of which, deception and error, have been extensively dis-
cussed; and (E) four or five media, which have not figured sig-
nificantly as such in the analysis. To some extent, all of these
aspects have been related to each other, though ideally a series
of tables might more clearly intercorrelate, in particular, A and
B, B and C, A and C, D and A, D and B, and D and C. This overview
gives some notion of the breadth and complexity of the domain.
Still remaining in the analysis are two special points of inter-
est.

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ENCEPHALIC VERBAL BEHAVIOR

In this report there have been numerous references to ver-
bal emission and reception in the same person, that is, the
behavior of a person speaking or writing to himself or herself
as both Emitter and Receiver, whether or not there is another
Receiver. The shorthand term for this behavior is "self-talk."
Because the vocal type can be silent and thus not directly acces-
sible to others, it is difficult to investigate. Increasingly,
however, behavioral science has been looking at this kind of
behavior. As noted at the outset, Skinner (1957) made quite clear
that such inquiry is both legitimate and necessary, though his
investigation was based on personal observation, analysis, and
references rather than systematic or experimental study. It did,
however, counter a prevailing notion that only overt behavior was
the province of behaviorism. But he viewed verbal behavior, overt
or covert, as in itself a legitimate object of research, rather
than as a window to hidden internal (mental) processes as prime
movers.

Self-talk behavior deserves some special discussion because
of its significant role in explaining and differentiating errors
and deception in communication, though to examine it one must
find one's way through a morass of such terms as covert/overt,
private/public, self-monitoring, introspection, protocol analy-
sis, memory (various categories), mental, cognitive, awareness,
consciousness, self-report, and subjective. Illustrating the
confusion, the last may refer to an experimental participant's
verbal report about an event also observable by the experimenter,
about an event not observable by the experimenter because it
occurred elsewhere or in the past, about something pertaining to
the participant, or about an event that only the participant
could sense because the locus of the event was within the partic-
ipant; it may refer to the interpretation of an event, overt or
covert, by the participant; or it may refer to a participant's
talk to himself or herself, aloud or silently. Since numerous
philosophers, psychologists, and physiologists have analyzed and
speculated about the self-talk domain over many years, this
report can hardly do credit to its complex issues, if only
because the author hardly regards himself as expert in them. But
they cannot be disregarded.

"Encephalic"

As a safeguard, to head this section a term has been chosen
that, one hopes, avoids alternative ideology-laden terms.
"Encephalic" means "inside the head." It is assumed that neural
encephalic activity accompanies all verbal behavior, and also
that considerable verbal behavior goes on only encephalically.
Supporting the latter inference are transformations that occur
between overt verbal input to an individual and the individual's
overt verbal output, such as additions in "mental arithmetic." As
pointed out earlier, speakers make mistakes--or slips, as Reason
(1990) or Norman (1981) would call them--in mixing up small
verbal components, and Skinner (1957) described many of these.
They indicate transformations in interverbal behavior between

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verbal input and verbal output at some later time that can occur only encephalically; the input-output transformation has no explanation in ongoing tacts or mands. The same might be said of paraphrasing and summarizing or abstracting. Perhaps the most obvious transformations are changes in tacts with the passage of time: alterations, consolidations, elaborations, etc. (their demonstration depending on comparing two tacts rather than a tact after an event with the event itself).

Encephalic neural activity as an accompaniment of verbal behavior has been inferred from experimental disruptions in a speaker's performance by delays in feedback to the speaker from the speaker's oral verbal behavior (e.g., Smith, 1962). In manual verbal behavior typists correct mistakes before the keys reach the paper, indicating self-detection (e.g., Rabbitt, 1978), though that may be attributable to kinesthetic feedback rather than encephalic-only processing. These feedback demonstrations objectively support the assumption that an Emitter is also a Receiver and talks to himself or herself, silently as well as aloud. In addition, McGuigan (1978) has summarized a large number of studies using EMG recordings from various head locations indicating that "covert oral behavior increases over baseline during the covert performance of a wide variety of language tasks" (p.202), as well as recordings from other body locations indicating EMG reactions during various "cognitive" tasks, many of which included verbal behavior. McGuigan further summarized a large body of literature showing changes in electrical brain activity (e.g., EEGs) during silent verbal behavior, such as mental arithmetic and reading.

Skinner (1957) had the following to say, in his treatment of "self-editing," about what this article calls encephalic self-talk: "Subvocal behavior can, of course, be revoked before it has been emitted audibly....The speaker tests his behavior on himself before offering it to the ultimate listener....Much of the self-stimulation in the autoclitic description and composition of verbal behavior seems to occur prior to even subaudible emission. In both written and vocal behavior changes are made on the spur of the moment and so rapidly that we cannot reasonably attribute them to an actual review of covert forms....Evidently stimulation associated with the production of verbal behavior is sufficient to enable one to reject a response before it has assumed its final form. The subject is a difficult one because it has all the disadvantages of private stimulation" (pp.370-371). Further, Skinner wrote: "If editing is to occur, the speaker must react as a listener to his own behavior," receiving "feed-back" from it (p.384); "It is perhaps commoner for the speaker to respond to his own behavior but not to the variables which control it....Controlling variables are especially likely to be over-looked when they enter into multiple causation" (pp.386-387).

The assumption that self-talk occurs arose initially from self-reports called introspections, whose validity was suspect because investigators had no direct access to them. However, investigators can have direct access to what is said aloud by a person to himself or herself about himself or herself, and an inference can be made that whatever is said aloud can also be said silently. Further, the occurrence of encephalic-only trans-

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formations has supported suppositions by cognitive psychologists about still other encephalic activity, "underlying" verbal and other behavior, such as "representations" and "schemas" that are "stored" in "memory." These are presumed to account for subsequent verbal behavior about objects, events, conditions, or their properties and their relationships. Apparently no covert or overt verbal behavior--tacting--about them is presumed to have occurred when they were directly sensed, so any tacts are first emitted in recall. How the sensory inputs become converted later into verbal reports is still a physiological mystery even greater than conversions of discriminations to tacts that occur at the time of the sensory inputs. The attribution simply to "memory" is no solution. Since some amount of time always intervenes between discriminators, effectors, and consequators, nonverbal or verbal, "memory" would seem to be omnipresent. Then it, "storage," and "representation," also omnipresent, would seem to be names simply for neural activity. Nevertheless, cognitive psychologists have gone to considerable lengths to achieve verbal access to another individual's encephalic activities to demonstrate further their occurrence and justify speculations about them. Such efforts are called "protocol analysis."

Protocol Analysis

An investigator asks questions or makes requests (two kinds of mands) and an experimental subject in response says (tacts) what is occurring encephalically, that is, in his or her head. The subject's report is called a protocol. Since it is dependent on the experimenter's mands, including any tacts among them, these should be regarded as part of the subject's performance--as should an investigator's instructions in any experiment. The experimenter codes the protocol, that is, categorizes its components in terms of "the cognitive processes underlying verbalization" (Ericcson and Simon, 1984, p.9), although some psychologists abstain from a formal, a priori coding scheme and "search for interpretations...in parallel with the search for an appropriate model or theory" (p.6). In either case the subject's report of encephalic activity is accepted as evidence that such activity is occurring, or has occurred (disclosed in retrospective reports), and the self-report's content is accepted as as evidence of the kind of activity or process reported. Such activity or process is especially interesting to protocol analysts if it involves relationships among objects, events, conditions, and their properties, rather than just these matters themselves. The analysts delve for such "cognitive processes" as memory search and retrieval, inferencing, and reasoning. Protocol analysis, then, constitutes a method in addition to those noted above for inferring encephalic activity. But it goes further by inferring underlying processes directly from the self-report rather than inferring encephalic processes by comparing inputs and outputs accessible to the investigator also.

Nisbett and Wilson (1977) questioned the accuracy of protocols dealing with self-observation of such encephalic activity, asserting that "people often cannot report accurately on the effects of particular stimuli on higher-order inference-based

responses" and "they may base their reports on implicit, a priori theories about the causal connections between stimulus and response" as well as make correct responses that are simply "due to the incidentally correct employment of a priori causal themes" (p.233). Like Ericcson and Simon (1984), these authors were interested primarily in reports of encephalic activities that involved relationships rather than reports simply about objects or events as such.

When subjects are asked to tact (report their discriminations) of objects or events in psychophysical experiments, there is less controversy about the accuracy of their reports if only because the experimenter can also have sensory contact with the external object or event (and is self-evaluated as accurate), and in any case the subject does not report the encephalic process responsible for the report. Such reports are nevertheless subject to error, due to "bias." Positive or negative consequators for false negatives or false positives are the bias sources (in signal detection theory experiments). Errors seem more likely not only in tacting external relationships, including contingencies, but also in tacting encephalic activities involving these. The Emitter is his or her own Receiver, from whom there may be no feedback, or if there is any, it may be unreliable. Whether consequators or subsequent discriminators occur encephalically-only is discussed later.

Self-Talk

Given as fact that one can function as both Emitter and Receiver, receiving one's own emissions and in turn emitting back to oneself, what are the variables to consider in such a dialog? One is the medium, vocal or written. Another is another person's access to the effector. An effector spoken aloud can be heard by the self but not by another if not present; it can be heard by another if present or if recorded. Another person has no direct access to an effector spoken silently. An effector that is written can be read by the Emitter but not by another person without access to it. It can be read by another if it is transmitted to another or made public. Thus an aloud or written effector can be just as "covert" or "private" as silent speech.

Another variable is what the verbal behavior is about, the topic. It can be about oneself, or another person, or some other aspect of the environment. If about oneself or another person, it can concern some behavior or physio+ogical process or anatomical feature. If about oneself, one can talk or write about it as actually discriminated by oneself visually or audibly or by touch, but one can talk or write only inferentially about a lot of things that cannot be so discriminated; one cannot except with a mirror report the appearance of the middle of one's back or the top of one's head, though one may still talk about them as if one could (perhaps erroneously). One cannot discriminate, and thus report directly, many conditions and events under the skin, muscles contracting or relaxing, proprioceptive or kinesthetic stimulation, digestive processes, internal glandular secretions, etc., though one can see and then tact an arm moving up or down, the body's balancing, digestion's products, and external secre-

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tions, and so can another person nearby.

But what can one sense, discriminate, and tact pertaining to one's own body and behavior that another cannot? That is where uncertainty and controversy have arisen (as in the disagreement between Ericcson/Simon and Nisbett/Wilson), ultimately to be resolved through neural science as inferences continue to be adduced by both behavioral and cognitive psychologists. This is hardly the place to pursue the matter further.

A Verbal Approach. Of more interest for this analysis is not what a person can self-report about processes inside the head but what might be inferred about such encephalic behavior from the behavioral perrspective this article has presented. Consider as a hypothesis that Skinner's four types of verbal behavior can occur encephalically without accompanying overt effedtors. An exchange between Emitter and Receiver takes place with the two roles in the same person.

Self-Mands. In the case of mands, the Emitter must be manding himself or herself, through a question, an exhortation, an intention, setting a goal, expressing a desire, a self-direction, a verbal decision between effectors--to do or or say something or to not do or say something, perhaps to say it encephalically only, as in self-questioning about some item of "knowledge" or in "memory," perhaps to say something tact-like aloud that differs from a tact that is occurring only encephalically. The encephalic mand as such cannot be directed at another person as Receiver because that person cannot hear or read it. But it may be a rehearsal for one that is then emitted out loud. Or it can be a mand to oneself to say or do something (overtly) to another person. If it does then result in another's behavior, that behavior is a consequator for the encephalic mand though perhaps not as effectively so (by being indirect) as will be the same consequator for the overt mand that the Receiver actually gets. If the encephalic mand is self-directed only, the consequator can be some occurrence resulting from the action manded. For example, if one directs oneself verbally--and silently--to turn right to reach one's destination, and one does so, both the steering behavior and the encephalic mand that preceded and occasioned it are positively consequated. The driver may also emit some verbal self-consequation. The consequator for some encephalic mand may be otherwise intrinsic. As with overt self-directed mands, the Emitter is consequated simply by the effector's emission. A silent resolution to forego some action, e.g., smoking a cigarette, occurs because that resolution behavior itself removes some anxiety or guilt. This consequator may not be as effective as it would be for an overt resolution that might also have an external consequator, and it might have little effect on smoking in any case.

One must wonder also about the potentiator associated with the consequator. The state evinced by anxiety or guilt may be the potentiator related to abstention from smoking. Goal-setting as the potentiator that makes reaching one's destination an effective consequator for driving toward it may strengthen the consequator for silently self-manding the right turn. One must also wonder about the discriminator. This could be the view of an intersecting street that leads to one's destination, or an

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encephalic intraverbal about sequential intersections. In short, the consequator, its potentiator, and the discriminator accounting for some encephalic mand may each come from the external environment. Or they may occur within encephalic verbal behavior to some extent if they can occur within the verbal system overtly.

An important issue is the frequency of encephalic self-manding. When does it _not_ occur? Surely one turns right many times without telling onself to do so. Not all behaviuor is covertly self-manded, and perhaps relatively little is. To the extent that intention is a mand, not all behavior is intentional. Much of it, both nonverbal and verbal, is so habitual that verbal intervention through self-manding seems unnecessary and would slow ordinary behavior to a virtual halt. One way to examine the frequency issue is to consider the variables that account for self-manding, an approach seemingly neglected by those who have assigned scientific validity to such terms in folk psychology as desire, intentionality, purpose, etc.

Self-Tacts. There are two kinds of encephalic self-tacts. In each, one is talking _to_ oneself, silently, but they differ as to what is tacted. One self-tacts either _about_ the external world or _about_ oneself. In self-tacting _external_ world phenomena, one is receiving inputs (possible discriminators) through one's senses (visual, auditory, tactile) but the outputs (effectors) to oneself are by definition encephalic only. As with any tact, the nature of the _antecedent_ discriminator for the self-tact is contingent on some kind of consequation. But no verbal consequator ("motivational feedback") is directly available from others, nor can such nonverbal feedback come directly from the physical environment, though such feedback can come fron ensuing verbal or nonverbal effectors. Verbal feedback can come directly only from oneself to shape the encephalic tact. Any such verbal consequator from oneself would have to be some kind of silent interverbal reinforcer (positive or negative). Might such exist? As for any _subsequent_ discriminator resulting from the effector ("information feedback"). it too would have to be only encephalic (and interverbal) since no encephalic effector can act directly on anything external. The encephalic tact fails to reach another person whose own discriminator-based tacts are similar or differ. At best, one _may_ hear that other person emit such tacts, and these may have some effect interverbally on one's own encephalic behavior.

Encephalic self-tacts about _oneself_, the other variety, have similar constraints. Some possible discriminators are received through the senses, as in seeing, hearing, or touching onself, or feeling pain or proprioceptive or kinesthetic stimuli. One can tact these inputs silently or aloud. But whence come the consequators to shape such encephalic tacts? Apparently they can come only from feedback to verbal or nonverbal effectors that are occasioned by encephalic tacts. The sources of that indirect feedback are other persons and things. According to some theorists and investigators, other possible discriminators are received not through the senses but directly from encephalic states and effectors, in encephalic closed loops, so to speak, and become accessible through introspection or protocol analy-

sis.

Self-Interverbals. With interverbals there are fewer confusions about discriminators, since by definition one verbal effector can be the discriminator for another in intraverbals, echoics, and textuals. As well-conditioned overt verbal behavior, with attendant generalization to provide variation, overt inter- verbals bestow their consequator-derived strengths on encephalic effectors that parallel them and are derived from them. Much encephalic verbal behavior seems to be related to overt verbal behavior in this way. One says silently what one said out loud or what one is reading, perhaps adding some variations intraverber- bally. In addition, within encephalic self-talk one silent verbal effector may lead intraverbally to another, as occurs in aloud self-talk. One can calculate arithmetically in the head, inter- pret from language to language in the head, and read print in the head if one can do so aloud. There is no immediate need to relate an interverbal to the external world by having an effect on it to produce a consequator or depending on it to provide a discrimina- tor (though that can be useful in coping with interverbal abstractions). Because interverbals constitute a world in them- selves, a kind of closed subsystem within the verbal behavior system, lacking the constraints of mands and tacts, they appar- ently can function encephalically with considerable ease.

Self-Autoclitics. In their subcategory of relators of verbal effectors to each other, autoclitics are essentials in the verbal behavior system and thus can be found in encephalic self-talk. As they become established in overt verbal behavior in varying extents according to education and individual differences, they presumably transfer to the encephalic mode, continuing to draw strength from their use in overt behavior. If that linkage is disrupted encephalic relators may become unreliable. Perhaps that is what happens in dreams and delusions. Some linguists assume that autoclitic relationships, as in syntax, are innate rather than acquired. From this perspective it might be claimed that they are encephalic to start with and transfer to, not from, overt verbal behavior. In the autoclitic subcategory of qualfiers it seems more difficult to relate them functionally to encephalic self-talk since these qualify the impact of an Emitter's effec- tors on a Receiver, and in encephalic self-talk the only Receiver is the Emitter. Nevertheless it is conceivable that at times one qualifies or modifies what one says to onself to influence one- self as the Receiver.

Self-Mands for Self-Tacts. It seems likely that emphatically as well as overtly an Emitter often mands himself or herself to tact, to another person or as self-tact, some object, condition, event, or characteristic in the environment (or in the Emitter); as indicated earlier, mands and tacts can be combined in various ways. Tacts somnetimes occur because an Emitter asks or directs a Receiver to tact something, and similarly one may ask or direct oneself to tact something, e.g., "What is that?" or "(I should) identify that." Generally, however, one simply sees or hears something and describes it, that is, many or most tacts and self-tacts presumably occur, aloud or silently, without mand-like self-talk preceding them. Nonetheless, if a self-tact is erro- neous and the Emitter discriminates the error, the Emitter may

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mand himself or herself to make a correction. Further, if some positive or negative consequator is directly associated with a tact or self-tact, one may first mand oneself to "get it right," that is, answer the question correctly or tell the truth, or mand oneself to avoid a mistake.

Nonverbal Encephalic Behavior. From one perspective not all encephalic behavior is verbal as that term has been used in this report. Much of it may parallel overt nonverbal behavior from which a person gets some feedback in its performance. One type could be self-graphic or self-pictorial imagery; the manual parallel in overt behavior is painting, sketching, drawing, or sculpting. Another may be musical composition or rendition, or motoric (limb and body) movement in athletics, or perceptual-motor activity, as in chess or surgery.

Cognitive Views. An emphasis on encephalic verbal behavior tends to create a link between a behavioral analysis of human performance and cognitive psychology, much of whose literature is oriented to "processing" verbal "information" in-the-head. Self-talk analysis can provide a verbal basis for much of "mental" activity. In particular, self-mands, aloud and silent, may help explain why "folk psychology" has resorted so extensively to such terms as intention and purpose. People do report their self-mands; they report them both to others and to themselves. In those reports they fail to furnish a functional explanation of them in terms of behavioral cause and effect, as a scientific analysis might require. Instead, to provide an explanation the self-mand is renamed as purpose or intention or desire and becomes the cause of itself. Or the source is assumed to be some inner agent or homunculus, not further overtly identified. This view is reflected in some theorizing about goal-setting. The analysis of self-mands can suggest a much needed behavioral bridge to and from this domain as well. Locke and Latham (1990) have acknowledged that setting a goal empowers otherwise neutral resultant feedback to operate as a consequator on subsequent behavior (not their terms). That is what a mand or self-mand can do as a potentiator.

Self-Report of Self-Talk. Let us return for a moment to the issues suggested in an earlier analysis of self-talk and protocol analysis. Based on the presumptions just presented about encephalic self-talk, it can be further presumed that this behavior can be repeated aloud, much as overt self-talk can be repeated encephalically, that is, covertly. It can be copied aloud not only to oneself but also to another Receiver. Such repetition falls into the interverbal category called echoics. When the copying takes place in writing (if it does), it is called textual. When it is cross-modal, it is called intraverbal. (It may also occur between encephalic imagery and manual copying in sketching or painting, for example.) As in all iteration, especially between modes and submodes (encephalic and overt), the copy may be imperfect, inaccurate, imprecise. Distortions are more likely to develop as time passes ("memory failure"), or as positive consequators for accurate reproduction diminish. Encephalic self-talk may be repeated echoically or intraverbally also as further encephalic self-talk, with similar constraints. Such self-talk includes, as the analysis has supposed, both mands and

tacts as well as interverbals and autoclitics. These may involve the Emitter's own behavior.

When some encephalic self-tact or self-mand is copied either encephalically within the Emitter as Receiver or aloud to another Receiver, the Emitter has a verbal label for such repetition, a label acquired in learning a language (in this case English). The Emitter tacts the copying as "awareness." When the copying occurs, the Emitter may say, "I am aware of...," or after it occurs "I was aware of...." Since much of what we see, hear, or do we never tact to ourselves nor do we mand ourselves in most of our (habitual) behavior, we usually fail to say to ourselves or another Receiver we were aware of seeing or doing or wanting this or that. In fact, when asked we are often likely to say "I was not aware of...." In one's driving to some familiar destination, how many right or left turns have been preceded by some encephalic verbal intermediary?

A behavioral explanation of "awareness" or "consciousness" such as this differs from most or all cognitive analyses of these constructs by recasting them into the operant functional framework and categories of verbal behavior in place of "thoughts" or "ideas" emanating from some special source, such as "mind." That approach seems to have influenced much of the protocol analysis research mentioned earlier in this article and to have been responsible for some of the discord concerning such research and "introspection" in earlier times. The verbal behavior framework does not exclude other, perhaps similar processes, for example, pictorial self-imagery and musical self-composition, and their repetition and interaction between encephalic and overt manual performance. Indeed, it appear reasonable to suggest there occurs considerable encephalic traffic between self-talk and self-imagery. Due to the difficulty for a Receiver/observer to gain access to self-talk, the ultimate demonstration of its varieties and functions may have to await further research in behavioral neurology. However, the current analysis may help guide such research, e.g., in neural networks. It may also suggest better ways to conduct protocol analysis to provide more reliable inferences about encephalic behavior.

Error and Lying. Earlier it was suggested that error and lying are distinguishable according to the controlling variables and categories of verbal behavior involved in each. The foregoing speculations about encephalic self-talk can amplifiy that point, at the risk of some repetition of previous analysis. Both lies and mistakes are distorted tacts or distorted intraverbals. As a deceiver an Emitter self-tacts a sensed discriminator or self-states an intraverbal but transmits to a Receiver a verbal effector that is incongruent with that self-tacted discriminator or self-stated intraverbal. That verbal effector may embody an invention, a substitution, an omission, an exaggeration, or a minimization. It refers to something current, in the past, or in the future. It concerns what the genuine tact indicates: some object, condition, event, or characteristic in the physical environment, some aspect or action of another person or group, some condition or behavior of the Emitter, or with an autoclitic some relationship among the foregoing (including negation). As an intraverbal it may contain the same kinds of distortion with

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similar referents. No doubt a more comprehensive taxonomy of verbal deception could be devised. In all cases, however, several properties distinguish the falsehood from an error. The liar has self-tacted the actual discriminator or self-stated the actual intraverbal, but the Emitter of a mistake has not (though he or she may do so subsequently, even in the course of making it). The liar self-mands the distorted tact or intraverbal. When one makes a mistake one does not. The liar discriminates the difference between the covert, genuine self-tact or self-intraverbal without verbalizing that difference out loud or making a correction. The correct discrimination is absent before, at the start, and per-haps during and after the behavior of making a mistake; in its absence one cannot discriminate a difference, but when one does discriminate the difference one may try to correct it. In addi-tion, as pointed out earlier, the consequators and their potenti-ators differ when one lies and when one errs. The respondent behaviors also differ, yet have similarities. Some blame is attached to both error and deception. Error may create a hin-drance or derogation, usually of modest extent, though in various eras and cultures children--and adults--have been severely pun-ished for making mistakes. Deception can bring considerable moral or legal censure or punishment occasioning either guilt feelings or anxiety at being discovered, or both. One may act to avoid making a mistake and often may try to keep it a secret; the liar definitely acts "with intent" to deceive and definitely acts to keep it hidden. Generally people distinguish verbally between "errors" and "mistakes" primarily according to "intent"--which in this analysis is a self-mand to deceive.

Detection of Deception. In the literature on deception and its detection (Ben-Shakhar and Furedy, 1990; Druckman and Hyman, 1991; Hyman, 1989, 1991; Lykken, 1981; Saxe, 1991), error has been considered not as a distortion with which to compare lying but as false positives and false negatives that characterize polygraphy in the attempted detection of lying. This is not the place to review that literature. Rather, several aspects of detection merit mention that they have seldom if ever received.

Because errors and lies both can occasion autonomic reac-tions, any attempt to distinguish them through polygraph methods might present problems. But since a lie involves a self-mand to deceive and an error does not, might such a self-mand produce an autonomic reaction distinct from any resulting when the examinee makes a mistake or answers a difficult question correctly, thereby revealing the lie? If this were so, the polygraph tech-nique could include forced errors as answers to "irrelevant" queries in the relevant/irrelevant technique (RIT), "control" queries in the "control questions test" (CQT), and irrelevant multiple-choice items in the "guilty knowledge test" (GKT). This question can be decided by research that examines the kinds of autonomic reactions from making verbal mistakes of different types and levels of importance and comparing these with reac-tions to lies.

Another possibility, also alluded to earlier, concerns the kinds of questions concerning a lie that might be included in a polygraph inquiry other than queries involving some tact about an incident or the examinee's behavior. The examinee would be asked

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explicitly whether he or she had told himself or herself to
invent, substitute, omit, exaggerate, minimize, or deny an
account (a distorted tact)--not whether it was a true or false
account but whether the individual had or had not self-manded it.
The examinee would be asked further whether he or she was giving
one account to himself/herself "in the head" and another aloud to
the examiner and could tell them apart. This resembles the kind
of "conflict" situation that has been investigated in "two card
detection" studies cited by Ben-Shakhar and Furedy (1990, pp.62,
103-104). In these, significant physiological activity was found
among experimental subjects who remained silent, implying some
covert reactions; unfortunately, the descriptions of the studies
are somewhat difficult to interpret.

In another aspect worth some research, the kinds of queries
cited above could try to evoke changes in operant rather than
autonomic, respondent performance. The examinee would be asked to
verbalize both a genuine and a distorted version of a critical
tact, one of them showing active implication or guilty knowledge.
EMG recordings would be taken from facial or other musculature to
which the vocal musculature might generalize, as they have in
many EMG studies of such generalization during silent verbal
behavior (McGuigan, 1978). This inquiry might show two different
operant reactions in a liar, one from a hidden, genuine self-tact
and one from an overt distorted tact. According to Ben-Shakhar
and Furedy (1990), Luria (1932) suggested detection in a similar
"conflict" situation by means of hand tremors while pressing one
bar for "yes" and another bar (with the other hand) for "no."
According to McGuigan (1978, p.154), in research by Ellson et al.
(1952) "Frequency of eye movements was greater when subjects lied
than when they were honest. Motivation increased frequency of eye
movements."

The effects of consequators on the likelihood of verbal
deception in realistic situations or even simulations have appar-
ently been rarely investigated experimentally, except perhaps in
mock trials, but a few studies have examined their effects on
polygraph detection. Ben-Shakhar and Furedy (1990) cited one
study in which money rewards for avoiding detection increased its
likelihood and another in which threatening subjects with elec-
tric shock if classified guilty by the polygraph did not affect
detection efficiency (p.60). Various other detection investiga-
tions using polygraph techniques have attempted to influence
"motivation" through instructions to the subjects, with the
result in some that the more motivated a person was to escape
detection, the more likely to be detected. However, none of the
studies has made use of the operant paradigm as described in this
report or its framework of verbal categories. Such use remains
for future research.

RULES AND RELATIONS

Nature consists of more than objects, conditions, events, and
the properties of these. It includes relationships. These may be
just as significant for understanding nature as what they
interrelate. Though by no means disregarded--they constitute the
essence of science--they need to be confronted in their own right

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directly, explicitly, systematically and comprehensively. As pointed out in the section on Autoclitics, relatioships are omnipresent as, for example, spatial and temporal relations, differences and similarities, proximities and distances, inclusions and exclusions, coincidences and sequences, connections and combinations, causes and effects, and correlations, conditionals, and contingencies.

With a variety of labels, multiple relationships occur in human behavior as in the world around us, and in that subset of human behavior called verbal. They are included in the interactions between any individual's verbal behavior and the environment, including the verbal behavior of others--in short, between Emitter and Receiver. Such is the focus of this section.

Rules

Earlier sections have described relationships among discriminators, effectors, consequators, and potentiators in human behavior and have related them to verbal behavior's mands, tacts, interverbals, and autoclitics. This section deals with a kind of verbal behavior composed of these relationships, called "rules," that has been receiving increasing attention in the behavioral community. This particular use of "rules" should be distinguished from various other uses of the term in cognitive psychology, in human factors analyses of performance, in syntax and grammar, and in computer software, or, for that matter, in jurisprudence, ethics, and other domains. But all uses of "rule" seem oriented in some way to influencing relationships in human performance. As a result, rules are subject to error and deception, making communication inaccurate and thus ineffective.

Tact-like. Verbal behavior often describes a delimited array of relationships, namely, those within the behavior of another individual (or the Emitter) and relationships between that behavior and the environment, including other individuals. The behavior and relationships will have many regularities that constitute a norm for a group (from small to very extensive) of which the other individual is a member. A complex tact is emitted based both on discriminations of others' behaviors and on autoclitics relating them to each other; it usually occurs in conjunction with a tact of some particular behavior, nonverbal or verbal, of the individual. The tact describes regularities among the behavioral relationships. When E emits to R such a tact, R can thereby acquire a similar set of discriminations and autoclitics without needing to experience them directly. The words do the trick, or at least up to a point. Without that autoclitic-supported tact (which E acquired either interverbally or was "shaped" by functional relationships among discriminators, effectors, consequators, and potentiators), R might have had to go through the same consequation-based shaping experience. If R had done that, R's discriminations of another person's behavior probably would be sharper or more complete but would have taken a long time even if feasible. Behavioral psychologists have applied the label "rule" to the set of verbalized ersatz discriminations and relational autoclitics that R thus acquired, as well as to generalizations of these.

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Mand-like. But that is only half the story. Tacts are descriptive but as we have seen much of verbal behavior is prescriptive and goes under the label of mand. A mand may also include numerous relationships, including some that are tacts. An Emitter produces mands in lieu of some nonverbal potentiators that would be more difficult, time-consuming, inappropriate, or unavailable. Complex mands are mostly directed at some particular Receiver behavior, either nonverbal or verbal, but also can take the form of generalizations, derived in the Emitter from multiple experiences but more often from the Emitter's culture or subculture. Generalized mands in particular have come to be labeled "rules" by behavioral psychologists, who have also applied the term analytically to potentiator-consequator relationships in the abstract.

Definitions. The dual use of "rule" with respect to both tacting and manding came originally from Skinner (1969, 1989) and has resulted in considerable discussion, if not confusion, among behaviorists. As with many constructs, "rule" has taken on a life of its own as though it were something other than a verbal invention. This reification has been exemplified in efforts to "define" it. For example, Hayes and Hayes (1989, p.159) wrote that a rule is a "verbal stimulus" that is "something that tells us what to do, when to do it, and what will happen when we do it" (notably omitted is simply "to do it"), and Hineline and Wanchisen (1989, p.224) characterized a rule as "Describing relationships between actions and consequences." Others have offered definitions of a functionally less specific nature, such as Poppen (1989, p.335): "Usually a boiled-down, short-hand statement of a contingency" and Malott (1989, p.273): "A verbal description of a behavioral contingency." Hayes, Zettle, and Rosenfarb (1989, p.199) referred to "organization of events in a relational frame," and emphasized "relational responding" (p.184). Schlinger (1990), reviewing controversies about rule definitions, criticized some that have simply equated a rule with a discriminative stimulus (discriminator in the terminology of this report) or have focused on its antecedent position in the operant paradigm, a misplaced formal rather than functional emphasis. Some analysts have omitted or minimized references to tacts and mands. Few have followed Skinner in pointing out the major role of autoclitics in rules as structural arrangements or elements interrelating functional operants within and between sentences. There have been liberal references to "contingency," a term useful when employed with care but applicable to many different relationships in nature, human nature, and verbal behavior.

Emission of rules that function for the Receiver primarily as verbalized ersatz discriminations do not depend, any more than direct tacts, on consequation by that Receiver. Hayes, Zettle, and Rosenfarb (1989) have called them "tracks" (p.206) and the process of following them "tracking." As these authors noted, they may not imply consequators for following them, or they may, and that implication may come from the Receiver's prior history. Consider guidance signs on a highway. One sign indicates the direction toward a place of no particular interest, whereas another designates a path ("track") to a planned destination;

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reaching a planned destination is a positive consequator. Another example is a description of a possible new job that includes a pay increase as an "incentive" to take the job (and a positive consequator after starting to work). So future consequators, positive or negative, may be indicated in the rule as "if you do this, you will be rewarded"--or "punished." How much these verbalized future consequators influence current behavior depends on the individual's prior experience, direct or indirect (i.e., verbal), concerning similar ones in similar situations with similar behavior. Some psychologists and philosophers label rules incorporating future consequators "expectations."

In contrast to tact-like rules, the authors cited above have noted--or seemed to--that compliance with a rule can consequate either the Receiver or the Emitter, and often both. Hence they called this kind of rule a "ply" or an "augmental," and the process "pliance." The Emitter is consequated by what the Receiver does in compliance. The Emitter creates in the Receiver a potentiator ("establishing operation") such that compliance is a consequator for the Receiver. An "augmental" simply emphasizes the role of the Receiver. Rules of this sort differ from mands as analyzed earlier primarily, it appears, because of either their complexity or their generalized nature. They may be part of a mix with a tact-like rule. They are likely to include conditionals. When for a mand-like rule the Emitter and Receiver are the same, some psychologists and philosophers would call it an "intention." (See the section on mands for a similar analysis.)

Rule-giving. It seems that in the behavioral psychology community rule-giving and rule-following, and comparisons between them, have been discussed without much or consistent reference to the manding or tacting they resemble. Rule-giving should be distinguished from rule-stating by an observer, which is rule description. Rule-givers include teachers and preachers, parents and employers, officers and judges. They acquire rules echoically or textually (e.g, arithmetic or the Ten Commandments) through cultural practices, or empirically as a result of contingency-shaping, or through generalization from rules already in their repertoire, or in a modeling process (by imitating others or by giving rules they themselves have followed). With regard to mand-like rules, rule-giving depends in the last analysis on consequation from Receivers' compliance. With regard to tact-like rules (ersatz, verbalized discriminations), rule-giving may depend simply on Receivers' listening or reading, not on complying with what is in the rule. (To assure listening, a teacher rule-giver may resort to mand-like rules, i.e., threats or bribes). Whichever type of rule is involved, rule-givers give rules to themselves and thereby become rule-followers.

Rule-following. Rules are followed by Receivers in much the same way and for the same reasons that they react to tacts and mands. Tact-like rules help people find their way to their destinations. They help solve problems, because rules can provide verbal solutions in novel situations, with novel discriminators or novel required effectors (Hineline, 1989; Malott, 1989); Hayes and Hayes (1989) pointed out that verbal behavior can supply greater variation and complexity than nonverbal behavior. A rule can also provide greater generalization. Skinner (1969) wrote

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that when environmental contingencies demand action not available through high-probability nonverbal behavior or subject to aversive consequences, a person can stop and think, review contingencies and options, and formulate a plan of action, a rule. Mand-like rules (or tact-like-rules that specify future consequators) also have major advantages. As Malott (1989) has noted, a rule can bridge over delays between an effector and a consequator when the delay would otherwise make the consequator ineffective. A rule, he added, can substitute for cumulative, small consequators that by themselves might be ineffectual, especially in competition with a single, larger consequator. All of these advantages, for each type of rule, may positively consequate rule-following.

Rule-governed Behavior. Rules can be either general or specific, heuristic or algorithmic. They can relate to the present, past, or future, to current events or conditions, those only in memory, and predictions or aspirations. Mand-like rules are often internalized as "conscience" and account for "self-control." They can be loose, as guides, or strict, as laws. They are assembled or codified in compendia, grammars, or manuals of instruction. Though they are pervasive, their extent has not always been grasped by behavioral scientists. Much of their recent research has occurred within the context of relations between nonverbal and verbal behavior. How do these affect each other? Which is dominant, when? With respect to rules, the issue has taken the form of rule-governed behavior versus contingency-shaped behavior. To what extent or when does or should new instruction about a rule supersede a habit when these are in conflict. To what extent and when do or should new consequators for older discriminator/effector combinations ("operants") or new operants in actual performance change behavior that has been rule-governed? The research on the "sensitivity" of rules to contingencies, amply reviewed in Hayes (1989), shows the value of examining nonverbal-verbal interactions from a behavioral viewpoint by focusing on operant behavior's controlling variables and on verbal behavior from a functional viewpoint, rather than merely engaging in generalities. For example, Poppen (1989) has enlarged the analysis of "congruent" (complementary) and "contrant" (competing) effects of environment and rule by including the further competition between positive and negative consequators, which can be paired alternatively with rule and habit (whether nonverbal or verbal).

Windsurfing. Consider a recent personal example. The author, with long experience in sailing small craft, began to learn to windsurf (board-sail). Some skills (habits) in boat-sailing are inappropriate in board-sailing, and new ones must be acquired. In the first attempt, on the Potomac, he spent most of the time overboard. His instructor told him to stand next to the mast and incline it forward to go off the wind and incline it aft to point into the wind. Good luck! You don't do that in a sailboat, which you steer with a rudder, not the mast, and you bring the sailboat closer to the wind to go into it. That somehow generalized to inclining the board's mast forward but this had the opposite effect. On a board one does bring the sail in with one arm, as one sheets in a boat's sail, but one tilts the mast forward or back with the other arm, and the coordination of the two arms is

a key requirement. Disaster! The negative consequator of swallowing Potomac water and repeatedly and arduously climbing back on board had little effect except a temptation to go ashore. Insufficient correct performance occurred to be positively consequated and thus be contingency-shaped. Besides, the art of placing and moving one's feet and balancing oneself on the tippy board seemed beyond the verbal instruction (rules) given.

Next act: a different instructor and method in Cancun, Mexico. The student starts with a tethered board in a placid lagoon and at first masters, with explicit rules, placing the feet, and practices balance. The instructor then gives the requirement and states an explanation (prescriptive and descriptive rules) involved in steering with the mast. The explanation with its relationships seemed most helpful in bringing compliance with the requirement. The mast is at the pivot point around which the board rotates in heading into or away from the wind. When the mast is inclined forward toward the bow, the wind will press on the upper part of the sail forward of the pivot point and make the board rotate away from the wind. Inclining the mast aft will caused the wind to press on the sail aft of the pivot point, so the stern rotates away from the wind and the bow rotates into it. This learner repeatedly told himself to incline the mast forward to rotate the board so it would point away from the wind and to incline it aft to rotate the board so the wind would make it point into it. (No doubt the associated visual image helped.) Success! Soon this initially "counter-intuitive" procedure and the rules for feet placement were supplanted by perceptual-motor skill. For keeping one's balance, especially with wave motion, no rule was available but once a good beginning had been made, practice on the Potomac brought continuous improvement, thanks to the threat of drinking more of the river and the joy of sailing.

Errors. When some contingency-shaped behavior (habit) and a rule for achieving the same consequator are incongruent (as in the author's initial experience with a sailboard), one of them can be called an error. A rule may be given and followed to prevent an error that occurs because a habit causing it is outdated (Vaughan, 1989) or otherwise ineffective. On the other hand, a rule may become misleading because of a change in the contingencies that had brought it about, as, for example, in the strengths of competing positive and negative consequators. Either a new rule or new contingency-shaping is needed to adapt performance to the change. When a difference in contingencies is idiosyncratic for a particular individual rather than general in a group, the individual rule-nonfollower is said to be "violating" the rule. Such changes or differences can lead to errors in communication as well as in other domains. The Emitter may make a mistake in giving a rule and the Receiver in following one. Hence the importance of rules in this report.

Rules can be in error for two other major reasons, whether they are descriptive or prescriptive, tact-like or mand-like. First, to maximize their advantages most rules are necessarily broad in their coverage. But some exceptions often seem desirable. Failure to provide or follow such an exception, or giving or following one too broad or too narrow, can result in what would be called erroneous performance. Second, rules usually

include relationships such as inferences, logic, conditionals. Among tact-like rules arithmetic is a prime example of those so well established that the rule giver makes no mistakes, only the rule-follower. Logic is similar. But many rules involve inferences and conditionals based on false assumptions. The logic may be good but the premise an error. Ordinary discourse is full of autoclitics relating different sentence components or sentences to each other inaccurately. When such erroneous relationships are incorporated in rules, the rule is erroneous. A rule-giver may create or invoke an erroneous rule and a rule-follower comply with it. Science attempts to reduce such errors but most rule-givers and rule-followers are not scientists, and even those rule-givers who are may state erroneous rules concerning a domain not their own, or even their own--notably in behavioral science.

Deception. Rules are also subject to deception. If the rule-giver self-verbalizes the error but does not notify the rule-follower, and if the former is thereby manipulating the latter to get some positive consequator or avoid a negative one, the latter is said to be deceived. Such errors in rules may well remain unrecognized because of the complex structures rules may have. Most rule followers are not well trained to cope with various kinds of relationships embodied in autoclitics. For example, to persuade a Receiver to take some action or change an opinion, a devious Emitter may successfully cite a single instance as a regularity, or a correlation as a cause. Lies may be included in rules to achieve what the rule-giver regards as a legitimate goal. For example, at times in their instructions (rules) to experimental participants, psychologists lie to them about the reasons for an experiment, because the participants' behavior would differ from that presumably caused by the independent variables if the actual reasons were stated; the wrong reason may be stated or the actual one simply withheld. Concealment in rule-giving is perhaps the most frequent type of deception. The rule-follower is easily deceived because, as mentioned earlier, it can be more difficult to discriminate a tact that is missing than a distorted tact included.

Human Factors. Human factors-oriented psychologists and engineers have also invoked rules and "rule-based behavior" to explain human performance. For example, Rasmussen (1983) distinguished between three kinds of performance, skill-based, rule-based, and knowledge-based. He defined the second (p.63) thus: "The composition of a sequence of subroutines in a familiar work situation is typically controlled by a stored rule or procedure which may have been derived empirically during previous occasions, communicated from other persons' know-how as instructions or as a cookbook recipe, or it may be prepared on occasion by conscious problem solving and planning." He added: "Very often the goal is not even explicitly formulated but is found implicitly in the situation releasing the stored rules. The control is teleological in the sense that the rule or control is selected from previous successful experiences. The control evolves by a 'survival of the fittest' rule...Feedback correction during performance will require functional understanding and analysis of the current response of the environment, which may be considered an independent concurrent activity at the next higher level

(knowledge-based). The boundary betwen skill-based and rule-based performance is not quite distinct, and much depends on the level of training and on the attention of the person...The higher-level rule-based coordination is generally based on explicit know-how, and the rules used can be reported by the person."

Much human performance studied and analyzed by practitioners of human factors engineering or ergonomics has been categorized as "procedures," sequential steps that are or should be taken by an operator of equipment or a maintenance person in performing a task. These procedures, some nonverbal, some verbal, are defined in print or diagrams in operating or maintenance manuals and handbooks, or in instructional materials in training programs. Though Rasmussen (above) coupled "rule" with "procedure," that has not been generally the case. In adopting Rasmussen's three-tier view of performance to distinguish rule-based mistakes from skill-based slips, Reason (1990) seems to view rules less as written prescriptions or descriptions concerning either nonverbal or verbal performance than as some kind of inner guidance applicable to the latter. Neither Rasmussen nor Reason has explicitly called a rule a kind of verbal behavior that can be either overt or covert.

Cognitive Psychologists. That reluctance has been even more marked among cognitive psychologists (who may include Reason). To these, a rule is not verbal behavior but "cognitive activity," with the implication it is not only covert but some kind of activity distinct from verbal behavior, e.g., as "thoughts," some of which may end up as verbal behavior. Further, as Reese (1989, p.18) has pointed out, "rules are the basic units of analysis in all information-processing theories," and "behavior is rule-governed." To a cognitivist, along with skills and strategies rules are part of procedural knowledge that acts on declarative knowledge, which is episodic or semantic (Hineline and Wanchisen, 1989). Since human information processing theory is addressed essentially to the use of symbols (e.g., language), its reliance on rules, which embody these, is not surprising.

Derived largely from computer programming, human information processing theory has emphasized the role of inferences for problem solving. Inferences are expressed in terms of contingencies in the form of "if, then" statements. The statements are called "production rules." When they are linked together in a computer program to solve a problem, the program may be called an "expert system." So in some respects human information processing theory shares with behavior analysis an emphasis on rules that include contingencies, though the verbal elements or structures that express these are not called autoclitics and seem to get less emphasis, as does verbal behavior as such. Human information processing theory also does not include the behavioral contingencies basic to behavior analysis, that is, those between discriminators, effectors, consequators, and potentiators. It concentrates on discriminators, neglecting the other controlling variables because data or information goes into the head but nothing comes out.

Software. To some extent, as suggested earlier, computer programs can be construed as verbal behavior as this is analyzed in this report. In the process of program production, the pro-

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grammer is the Emitter and the computer is the Receiver. The verbal behavior is overt, in the form of a "language" composed of alphanumerics (converted into bits--electronic signals). The programmer/Emitter writes mands (commands) and tacts (data), interrelating them in explicit relational terms (autoclitics). One might say that interrelated data become what is then called "information." The mands, tacts and autoclitics are "inputted" (i.e., emitted) to the computer as Receiver, and subsequently this Receiver as Emitter in turn emits mands, tacts, and auto-clitics to the computer user as Receiver. Thus, the computer as Receiver and then Emitter intervenes between the human Emitter and human Receiver (who are likely to be a different people). In the process of program use, as in interactive dialog (e.g., word processing), the user rather than the programmer is the initial Emitter, emitting commands and data by keyboard or some other device to the computer as Receiver. The computer in turn becomes the Emitter, sending commands and data verbally to the same human, now as Receiver. Rules in computer programming are embo-died in the "language" being used, perhaps in some form of logic. They have become especially important in the inference statements that are linked together in expert systems.

Linguistics. Rules have been emphasized also by linguists with respect to grammar and syntax. Rules for these, widely employed in instruction in speaking and writing, exemplify the formal approach to verbal behavior in contrast to the functional approach taken by Skinner and in this report. Since these two ways of examining verbal behavior have different objectives, except for scientific ideology they need not be antagonistic despite their differences in terminology and emphases. Syntax prescribes established arrangements of word forms to show their mutual relations in a sentence. Skinner (1957) considered rela-tionships between units of verbal behavior of various lengths mediated by autoclitic terms or structures within an explanatory framework of speaker-listener functional interactions rather than a formal descriptive/prescriptive one of grammar. In emphasizing sentences as the prime focus of syntactic analysis, some lin-guists have averred that syntactic relationships are governed by rules that are innate and covert, distinguishing language use as a unique kind of behavior. Skinner was more interested in verbal behavior that people acquire from their verbal environments as they do other behavior, through presumably such innate mechanisms or processes as consequation. A human's capability to substitute verbal rules (though not particular rules) for nonverbal sequences of behavior could also be viewed as innately acquired.

From the above summary it should be apparent that rule-governed behavior, that is, rules and the ways in which they affect verbal behavior, has become a major point of interest and analysis in the examination of such behavior from a number of different viewpoints. What especially distinguishes rule-governed behavior in Skinner's and this report's behavioral analysis is that rules are verbal behavior that controls nonverbal as well as other verbal behavior, in a Receiver as well as in the Emitter as Receiver. For cognitive psychologists, computer scientists, and linguists, rules are verbal behavior that controls only other verbal behavior, and only in the Emitter.

APPLICATIONS TO COMMUNICATION

This final section of the report looks relatively briefly at
some of the domains where the foregoing analysis can be applied
to communication in the world around us--including areas of
concern to the Army Research Institute--to make communication
more effective with respect to its accuracy. A thorough analysis
of each domain would call for a much longer report, but an over-
view may be illuminating. As with communication in general, each
domain could be understood better by applying the considerations
in this report. This report takes the first step toward under-
standing by describing and explaining the pertinent variables.

Considerations

The considerations applicable to the domains below are those
emphasized earlier: (1) Primary functional role of the Receiver.
(2) Importance of Emitter-Receiver interaction. (3) Location of
Emitter and Receiver in the same person. (4) Verbal behavior as
similar functionally to other human operant behavior. (5) Four
controlling variables in such behavior: effectors, consequators,
potentiators, and discriminators. (6) Interdependencies/
contingencies among these. (7) Key role of consequators. (8) Four
functional categories of verbal behavior: mands, tacts, interver-
bals, and autoclitics. (9) Particular importance of mands. (10)
Rules as relationships. (11) Likelihood of errors. (12) Likeli-
hood of deception. Applications of the above may provide counter-
measures against error and countermeasures against deception.

Communication Domains

Many domains of communication might benefit from examining
them more closely with respect to this report's analysis. What
follows is a brief overview of these to give some idea of their
scope and variety.

Instructions. Commanders give instructions to their subordi-
nates, managers to their staffs, parents to their children,
leaders to their followers. As Emitters they tell them (Receiv-
ers) to do something and perhaps why to do it. What consequators
do these Emitters give the Receivers and get from them? Do these
help to prevent errors? How much concealment or lying occurs in
them, and how much of this is necessary or harmful?

Training. Teachers (Emitters) tell students (Receivers) how
to do or understand something, how to operate or maintain or
program equipment, how to speak or write, how to communicate
effectively, how to function successfully, how to avoid mistakes,
how to correct mistakes, how to detect mistakes or deceptions.
How well versed are they in behavioral aspects of deception and
error?

Groups. Within groups, teams, and organizations, individuals
(as both Emitters and Receivers) interact verbally much of the
time, formally or informally, as an important communication
process. Subordinates communicate with superiors and peers with
peers. Groups include military units, business firms, athletic

teams, families, unions, churches. All have rules and their members are rule-governed. What rules should and could be changed? Which rules promote the accuracy of communication?

Commerce. Extensive communication goes on between a business and its customers, through advertising, display, billing, and sales people on behalf of the business (an Emitter) and queries, word-of-mouth discussion, check-writing, and complaints among the customers (Receivers). A company's errors or deception can lead to consumer protest or a move toward quality. Quality is now the name of the game. How effective is exhortation (mands) by itself?

Jurisprudence. Contracts, wills, and other legal agreements and arrangements involve contingency-specifying communication between the parties concerned as Emitters and Receivers. In court hearings, counsel as the primary Emitters (along with judges), supported by numerous rules of evidence, try to get witnesses as Receivers and then Emitters to testify without error or lying. How might more familiarity with behavior's controlling variables change the performance of attorneys in this regard?

Information Systems. These include military command, control, and intelligence (C3I) systems, air traffic control systems, newspapers, news magazines, and the news divisions of television and radio networks. Within any such system the communication of data among its components (Emitters and Receivers) involves a vast amount of human and machine information processing. Much of it consists of interverbals, often presumed to be tacts and thus misleading Receivers.

Media. Communication to Receivers is the raison d'etre for print and electronic media (Emitters), through news, analysis, history, opinion, and advertising. Ignorance, bias, rumor or gossip, time pressure, concealment, and deception constantly threaten the accuracy of such communication. What safeguards can be created to minimize these, by exploiting a functional analysis of verbal behavior?

Displays. Much communication is display-to-person. Displays may guide, label, caution, explain. Since displays are designed by people, ultimately they too involve person-to-person (Emitter-Receiver) communication, indirectly. Guidelines for display design come from human factors engineers, who are sadly unaware of the "motivational" variables analyzed in this report. Thus a display may be accurate but ineffective communication.

Warnings. By voice, print, or symbols, on the road, at home, and at work, warnings are supposed to induce users of technological devices to avoid some hazard. Despite design improvements to assure discriminability, intelligibility, and attention-getting, signs and labels frequently fail to produce such avoidance behavior and accidents result. The sign or label may embody a negative consequator, a discriminator, and an effector in a mand plus tact but insufficiently emphasize the contingent relationships among these. How to make warnings actually control human behavior remains a major challenge.

Manuals and Job Aids. As with displays, much communication is publication-to-person, to describe and prescribe procedures for operation, programming, or maintenance. Since they are written by people, they too involve person-to-person (Emitter-Receiver) communication. Most manuals and handbooks put the cart before the

hourse, first describing some piece of hardware or software and then saying what to do with it. In response to an operator's explicit or implicit query (a mand) when faced with a problem, they should first tell the operator what to do (behavior) and then what to do it with (a tact about the equipment or software).

Reports. Reports (such as the present one) are major Emitters in communication with Receivers (like the present reader). As medium-to-person communication like displays and manuals, reports are a vehicle for indirect person-to-person transmission of information and recommendations in many forms (e.g., vugraphs, memoranda). Absence of error and deceit (as in the present case, one hopes) does not by itself insure effectiveness (a reader's attention and understanding)

Interrogation. In this type of communication, information is sought by an Emitter and obtained from rather than provided to a Receiver. It includes interviewing and surveying, in person and by mail or telephone, and by query, questionnaire, and direct or cross-examination. The information acquired consists of both the Emitter's inquiry and the Receiver's responses. Indirect interrogation, e.g., mail surveys, may give no positive and some negative consequators to respondents to reply. Surveys have often suffered from Receivers' concealments, which are more difficult to counter than lies.

Tests. Testing is a kind of interrogation. In intelligence, knowledge, and aptitude tests, the Receiver's (e.g., student's) score depends not just on knowing the answer but also on understanding (familiarity with) the test's, and thus the test maker's (Emitter's), verbal behavior (in requests or queries). Communication is usually regarded as originating with the student, the Receiver. Direct interaction and consequation between Emitter and Receiver range from infrequent to nonexistent. Various countermeasures have been developed by test-makers and test-givers to assure validity of various types so results will not be deceptive.

Experiments. In experimental psychology, an investigator (Emitter) gives instructions to participants (subjects) as Receivers telling them what they should or should not do and also describing the experiment (with varying completeness and accuracy). Though these instructions (mands) are integral to experiments (including those on communication), they may be abbreviated or omitted in a published account as though they were not. An important issue is how much deception of participants should be permitted.

Human-Computer Interaction. With respect to the software-controlled functions of a computer interface's controls and displays, this kind of communication might instead be called user-programmer interaction. As noted, in real time dialogues the computer's software as both Emitter and Receiver intervenes between the programmer as the software Emitter and the user as both Receiver and Emitter. This kind of exchange is epitomized in expert systems, which also illustrate the roles of human Emitter, programmer Receiver and Emitter, and software Receiver in the programming process.

Electronic and Voice Mail. In electronic mail (including facsimile transmission) a message's sender (Emitter) and reci-

pient (Receiver) play much the same roles as in postal mail, though the temporal parameters differ. In voice mail the Emitter and Receiver roles resemble those also in telephone communication but not their interactions, since the Emitter can deliver a message (to be stored) noncontingent on contact with the Receiver, who may get it only later, if ever; and the Receiver can get the message noncontingent on contact with the Emitter. Especially from a behavioral viewpoint this is a revolutionary development in communication. What may be the effects on errors and deception? Viruses introduced into computer networks are notable new examples of deceit.

Voice Recognition/Synthesis. This is also a major development, similar to that of movable type replacing the stylus and the keyboard replacing the pen or pencil (and paper replacing parchment and electrical or electronic transmission replacing human or mechanical carriers). Now the human Emitter can communicate vocally rather than just manually with a machine, and the human Receiver can get messages by ear instead of just by eye. Though their numbers and identities may differ, relationships between Emitter and Receiver may not change much functionally as they interact through a machine by speaking and auding instead of by typing and viewing. Though direct speaking/auding interaction differs from writing/viewing by evanescence and audience size, with a machine intermediary copiers may evolve for the former as they have for the latter and provide longevity and distribution. Copiers have turned out to be major countermeasures against concealment.

Radio and Television. These technological developments in communication greatly reduced the contingent, and thus the functional, relationships between Emitters and Receivers. Tuning in or out (or not at all) and channel selection became the only Receiver options. Very little verbal behavior as described in this report occurs in watching television, partly because of its essentially pictorial nature but mostly due to the absence of the Emitter-Receiver interactions and associated variables characterizing human behavior generally. A disaster? Television as the intermediary for tacting the world has distorted viewers' (Receivers') discriminations of their social environments while enlarging them.

Deception and Error. With regard to a considerable amount of communication, systematic efforts are made to detect errors and deception in Emitters, and some to produce deception. Polygraphers, detectives, journalists, historians, and scientists try to detect deception. Editors, proofreaders, readers, and listeners detect errors. Others engage in public lying in various ways or make mistakes they do not recognize as such, in speeches, articles, columns, TV talks, sermons, books, testimony, eyewitness reports, advertising, and propaganda. Some mendacity and error directed at opponents are legitimized as in the interest of a nation or ideology, political or religious. Errors and self-deception distort both the nonverbal and the verbal behavior of credulous or uncritical Receivers; then they are transmitted further when these become Emitters as reports of UFOs, money-making opportunities, or paranormal events or experiences. A major contribution from a behavioral approach to verbal behavior

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may come in improved methods of minimizing and detecting deceit. To date the emphasis has been placed on differences in respondent behavior. Differences in operant behavior may become more detectable by applying knowledge gained through further research about the verbal behavior of the liar. Distinctions between error and deception may contribute to this process.

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